88

JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY

AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n)

EDITED AND PUBLISHED FOR

The American Veterinary Medical Association

BY

PIERRE A. FISH, ITHACA, N. Y.

Index Volume LI

NEW SERIES VOLUME IV

ITHACA, N. Y.

Published by the American Veterinary Medical Association

1917

List of Illustrations, Volume LI. New Series Vol. 4

Author's Index

Index to Volume LI. New Series Volume 4.

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PIERRE A. FISH, Editor **ITHACA, N. Y.**

VOL. LI., N. S. VOL. IV. APRIL, 1917. NO. 1.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

ARMY VETERINARY SERVICE

To the Members of the American Veterinary Medical Association and the Veterinary Profession:—In view of present conditions and the possibility that our country may be forced into the awful world war, we, as a profession, must show our loyalty and do our part in preparedness.

After consultation with the executive board and other members of the association, I have asked Dr. C. J. Marshall, of Pennsylvania, to act as chairman of a special committee on "Army Veterinary Service", and requested him to name the other members of the committee. He has named as his associates Veranus A. Moore, J. P. Turner, F. A. Bolser and Secretary L. A. Merillat. Dr. Marshall spent last summer in England and France studying the organization of the veterinary corps in the allied armies and is familiar with modern army veterinary organization. Congress has at last recognized our profession, and the medical corps of the army is now organizing the veterinary branch. The committee can be of assistance in such re-organization.

If our country is drawn into this war, many more veterinarians will be required in the regular organization and it will be neces-

sary to have a large reserve corps. The medical profession has started the organization of a reserve corps and I am sure our profession will show as much loyalty and patriotism. Dr. Robert V. Agnew, of the 5th Cavalry, some time ago succeeded in getting a number of veterinarians to volunteer their services in case of war. With the army veterinarians and all members of our profession working in harmony, we will succeed in getting something tangible which will be of material service to the committee and the medical corps in the organization of a reserve corps.

I appeal to all eligible men in the profession, who are so situated that they can volunteer their services to our country in case of need, to immediately send their names to the chairman of this committee, Dr. C. J. Marshall, 39th and Woodland Ave., Philadelphia, Penn. CHARLES E. COTTON, President.

THE BLUE CROSS AND THE RED STAR

The humanitarian work of the Red Cross organization in times of war or other catastrophes is too well known to require elaboration. The unselfish devotion of its members in performing work of mercy and relief to the stricken appeals to all. Equally exposed to disease, danger and suffering in a period of war is man's faithful friend—the horse. Until a comparatively recent period, there has been no organized effort to alleviate the sufferings of our faithful friend in a way commensurate with his services nor comparable to the relief administered to his master. In order to remedy this defect there was formed, at about the time of the Balkan War, an organization known as the Blue Cross, the purpose of which was to accomplish for the horse what the Red Cross has accomplished for the soldier. As to the manner and details of the organization we have no information, but indications point toward the humane societies as being actively interested and probably the originators of it.

Although the blue cross seems to have priority in the field of operations, as regards animal relief in time of war, its insignia seems to have been ignored or supplanted at a meeting held at Geneva, Switzerland, December 1914, for the purpose of making the movement international in character, and the adoption at that meeting, of the red star as its emblem. In the German and Austrian veterinary field hospitals, it is said, the red star flag is now in use.

The Royal Society for the Prevention of Cruelty to animals, the parent organization of all anti-cruelty work in the world, offered its services to the British army at the outset of the war. These were, at first, rejected as the Army Veterinary Corps seemed well enough equipped to deal with the situation. After three months of unusual stress the offer of assistance was accepted and there has since been harmonious co-operation between the two organizations Another English organization, the blue cross, a branch of the Dumb Friends League, has received no recognition from the British Army, but has devoted its relief work mainly to the French and Italian Armies. Although receiving no official recognition, the blue cross organization established a few base hospitals in France at the beginning of the war, when the French veterinarians were inadequately prepared, and cared for many horses before the regular army service was equipped for the purpose. The assistance has been continued but not under military regulations, and its efficiency is considered inferior to that of the English system of military administration.

Last May the American Humane Association accepted an invitation from the Secretary of War to undertake the work of volunteer relief for animals employed during war times in the United States Army, in connection with the regular veterinary department of the service. For this branch of their work they have adopted the name of the American Red Star Animal Relief. Since its organization many prominent individuals have become connected with it, and numerous local branches have been established. A special representative has been sent to the Mexican border to investigate the condition of the army horses, and a report has been prepared and submitted to the War Department. At the present time, it would appear that we have the blue cross as the emblem adopted by the A.V.M.A., and probably by other veterinary organizations, as the equivalent of the red cross, and the red star adopted by an American humane society as the same equivalent.

Standing in the shadow of a world war, the matter of preparedness is of vital interest. Physicians and veterinarians are co-workers in the conservation of human and animal life. The medical branch of the army has had official recognition and rank for many years. It has developed efficiency because of this fact; until the last year the army veterinarian has been denied official recognition. He has had the allowance of a second lieutenant

without authority. He has been under the jurisdiction of the Quartermaster's department, under the authority of laymen who could not distinguish between milk sugar and the deadly night shade. There has been little time for veterinary preparedness, and because of inadequate numbers and lack of official authority there has not been the maximum of efficiency.

Under the reorganized army bill passed a year ago, conditions have improved and the future offers more promise. Rank up to and including the office of major has been granted to the veterinary service and not least in the advantages gained has been the separation of the corps from the Quartermaster's department and its affiliation with the medical branch. This arrangement is in vogue in Russia and it is said to be effective. Some day our veterinary branch may become an independent corps as in some of the other enlightened nations. In the meantime with the medical corps standing by us as a big brother the outlook is hopeful.

With Russia as the only exception, the United States is the greatest producer of horses in the world. It has been estimated that out of 22,000,000 horses in this country, only 224,000, about 1% are of a type suitable for military purposes. In necessity, many others doubtless could and must be used, although not conforming to military standards. We are proficient in quantity, but deficient in quality. Our impairedness is illustrated by the fact that during one year of the Civil War the government purchased 221,000 mounts and to further emphasize our impairedness 611,700 horses and 167,387 mules have been sold to foreign agents during the first twenty-two months of the war. An unfortunate feature of this transaction is the large number of valuable mares that have been transported and lost to this country for breeding purposes. Our military authorities discountenance the use of mares in our army although they are equal if not superior to geldings for army purposes, a fact well known and utilized by the foreign armies.

A year ago our supposed army of 100,000 men included 15 cavalry and six artillery regiments, two veterinarians being attached to each regiment, a total of 42 veterinarians. Two veterinairans and two or three stable orderlies had charge of the health of a thousand horses. In the British veterinary corps in the present war we understand there are 382 men detailed to care for the same number of animals. Twenty years ago the British veterinary service was probably not much superior to our own. They

received their lesson in the Boer war. There was an appalling waste of animals and much financial loss to the government. Many of the horses abandoned by the British were carefully nursed back to health by the Boers and used against their former owners. Now the British system is considered one of the best and the efficiency of its veterinary corps has been remarkable. Of the first 100,000 horses that passed through the veterinary hospitals more than 70% were returned to the army, in many cases, in better condition that when first purchased. With increased experience even better results are being attained. Glanders, the great bane of horses in previous wars, is no more of a menace now than typhoid is among the soldiers.

The possibility that this country might be drawn into the war has existed from the first. There have been two and a half years during which some adequate preparation might have been made. But little change has appeared on the surface; deeper than official reticence, is to be hoped that forces have been at work to safeguard our honor and protect such treasure as we possess.

P. A. F.

THE VETERINARY REVIEW

Number one of volume one of the *Veterinary Review* under date of February 1917 has reached our desk. It is a quarterly publication edited by O. Charnock Bradley, M.D., D.Sc., M.R.C.V.S., of Edinburgh, Scotland. The number contains 102 pages, after the Foreword and an article by Professor Linton on "Feeding and Economy", the remaining pages are given up to abstracts, reports, reviews, notes on books and bibliography of veterinary literature. We are told in the Foreword that in 1914 there were about a hundred periodicals professedly devoted to veterinary science in one form or another. Aside from the question of expense, it is obvious that it is practically impossible for a veterinarian to keep in touch with all that is going on in his chosen field. Particularly is this true when we consider the fact that there are many articles of importance in the veterinary field which appear in many periodicals not especially devoted to veterinary work.

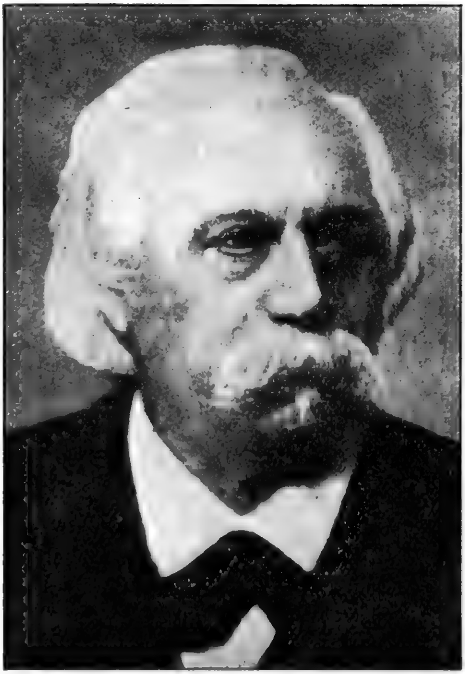
The effort to correlate this great amount of material, and to present it in concise and available form to the veterinary profession, is a work of great merit and should receive the hearty and appreciative support of all veterinarians who desire to keep up to date.

P. A. F.

EUROPEAN CHRONICLES

Bois Jerome.

Dr. A. Chauveau.—Although the death of this illustrious veterinarian has been known for some time, and while much that could be written of him has been published, the readers of the *Journal* will appreciate that if I appear late in paying my tribute to this great scientific figure, the peculiar circumstances of distance and my opportunities to correspond with them is my excuse for my concise remarks, which with the accompanying likeness I am able to send at this time.



Auguste Chauveau

The great master of French physiology, the scientist who, with Marey, created the graphic method; who laid the angular stone upon which rests the physiology as well as the pathology of the heart; who fixed the mechanism of muscular energy; who among the first undertook the study of viruses; has died at the age of 89 years.

To the end of his life, Chauveau enjoyed an astonishing activity. He worked continuously, looking for new researches, re-

viewing and completing his past work. His mind was strong with the energy and activity of his youth. His knowledge and erudition were such that he could still follow the various and great strides of biology, and yet he remained a valuable guide for the younger men, who attempted to follow him and his investigations in physiology.

Born on the 23d of November 1827, Chauveau entered Alfort in 1844. He graduated in 1848 and the same year was appointed Adjunct at Lyon where, in 1863, he became professor of anatomy and physiology. In 1875 he was named director of the school. In 1877 he graduated as a physician after having already occupied the chair of experimental and comparative pathology at the faculty of medicine of Lyon. When Bouley died in 1886, Chauveau was called to Paris and appointed General Inspector of the veterinary schools of France. Successively we see him professor of comparative pathology to the museum of natural history, titular member of the Academy of Medicine, of which he became president. He was a member of the Academy of Sciences and of the Society of Biology. He had for years been a member of the Societè Centrale de Médécine Vétérinaire of Paris. He belonged also to many other scientific bodies. Among the foreign countries which wished to count him among their members, the American Veterinary Medical Association was one which was honored by his honorary membership.

Circumstances and space do not allow me to say more of the great loss that French science has sustained by the death of Chauveau. In another communication I hope to be able to offer the readers of the *Journal* a list of the works published by Chauveau and the titles which have won for him the admiration of the scientific world at large.

A further account of the work of this illustrous veterinarian is given in the following pages.

Air Cure in Mange.—Among the various diseases which have been most troublesome in the armies engaged in the present conflict, at least in the French cavalry, mange is one which has required the application of the most severe measures. Placed in the list of contagious diseases, the regulations to prevent spreading and, in the present occurrence, possible detrimental effects, were most severe and their application quite difficult. The disease is very

liable to spread, animals have to be isolated, therapeutic applications are, to say the least, most generally of little avail. To control the affection and prevent dangerous epizootics have kept army veterinarians very busy.

In the *Revue Generale,* Principal Veterinarian Berton has an article which is of great value and brings out in the management of mange and its treatment, a natural aid which has generally been too much neglected.

The treatment of *mange by air cure* is certainly a therapeutic progress of no little value. A progress no doubt, for it shows that an animal affected with generalized mange, thin, poor in general condition, almost without the aid of any therapeutic agent, if placed in hygienic condition will get well of mange, while a subject suffering in the same manner, treated by the ordinary therapeutic agents, kept isolated between the four walls of a stable, will, for months and months after relapse on relapse, represent an animal whose absolute recovery will remain doubtful.

The proof of the above follows: Twelve animals were in a most pitiful state, they had patches of mange, widely spreading on the neck, withers, back, ribs and rump; they were constantly scratching. Arrived at the depot of sick and wounded, there was no room for them. They could not be admitted and they had to be isolated. A field was hired some distance from the depot and they were turned out there, with plenty of hay and oats. A little running water in the field gave them water to drink.

Two weeks later, there were possibilities of bringing them to other quarters, especially used for mangy horses, but they were exhibiting such evidences of improvement, that it was decided to let them remain a little longer in the same condition without medical attendance.

Result: after two months the twelve horses were perfectly cured, fat, full of energy and returned to their work.

A doubt, however, existed: the diagnosis of the condition of the animals, when entered for treatment, had not been made; the parasites had not been looked for.

Another squad of twelve mangy horses arrived. The parasites were looked for and found, and the twelve horses placed as the first had been, viz: at liberty night and day in the field, without being clipped, without cleaning, brushing or washing, but well fed and having free access to water.

At the beginning of this second experiment the condition of the horses was horrible, they had extensive patches of mange spread over a wide surface, sarcoptes, psoroptes, symbiotes had occasioned loss of hair on the whole body, the mane, the tail and the extremities.

After two months, ten of the horses were perfectly cured and ready to resume their work. The other two horses, old and worn out, had died during the experiment.

These two experiments were conclusive. In placing in evidence the great influence of the air-cure, which is the hygienic method, the related conditions must not, in ordinary practice, be considered as implying the neglect or suppression of the therapeutic treatment.

The experiments show the uselessness of interference which among other faults has that of promoting cutaneous irritation, therapeutic dermatitis, which for months disqualify unnecessarily animals which might have resumed their work earlier. All that is necessary is a few days of medical care in the stable and several weeks at liberty in fresh air.

Principal Veterinarian Berton divided the treatment of mange into two periods. The first embraces clipping, cleaning and removal from the skin of all scabs, etc., but no ointments, oils, grease or vaseline. Sprinkling with ward solutions is better. He recommends potassium sulphide at 2%–2½% renewed several times a day. This is the therapeutic period.

The second is the hygienic. Remove the shoes and let the horse run at liberty night and day, giving him plenty of good feed, hay and oats and access to water.

This method of treatment is simple and among its many advantages has that of acting directly on the acarus and on the soil, where it lives.

Castration of Mares.—Since the time Charlier devised his method of castration of cows, the operation has gradually found its application to the larger females and the results obtained by ovariotomy in mares as well known and sufficiently appreciated by veterinarians, who do not hesitate to perform it when indications are proper.

That it has not entirely taken the lead over the old fashion of operating by the flank for some classes of animals and in some re-

gions, is not to be ignored: nevertheless, with all the improvements made on the original method of Charlier, whether on instruments or other details, the general stages have remained the same, viz: the entrance to the ovaries by the vagina has always been obtained through the upper plane of the vaginal canal.

In the *Veterinary Journal,* of November, there is published by Dr. E. Graub, Army Veterinarian at Bern, an article entitled *A Modification in the Technique of the Castration of Mares,* which deserves attention.

First, the author remarks that today the operation of castration of mares is exclusively performed through the vagina, and that, with asepsis, it is the only method that offers security for a technically good result.

After a few remarks relating to the abuses of vaginal injections and fearing that the preparatory disinfection of the vagina can easily be carried too far, he recommends a preparatory disinfection to be carried out with consideration and moderation and the observance of asepsis as necessary for good results.

Measures are then advocated as to diet, the administration of chloral in some cases, the advantages for operating in the standing position, the emptiness of the rectum, disinfection of the vulva and vagina, all of which are essential. Then the author speaks of the operation. He makes the "vaginal puncture with a straight covered bistouri, attached to a chain. The blade must be broad and not sharper than a badly ground table knife. The perforation of the vagina by a puncture is preferable to an incision through the vaginal mucosa. In opposition to the general practice, he makes his opening in the vagina below."

The following is the description of his modus operandi. "The bistouri closed, pressed by the thumb against the outstretched fingers and introduced into the vagina, where the anterior edge of the pelvis is readily felt on the floor of the organ. The point of the fingers are placed under the external orifice of the uterus (os uteri) and pressed slightly cephalad, stretching the floor of the vagina. In the tense mucosa, the bistouri with the blade shoved forward by the thumb is thrust forward and downward. With the drawing back of the knife, the fore-finger is inserted into the punctured opening and the bistouri is removed by an assistant pulling on the chain attached to it. Successively when the fore-finger has been introduced through the vaginal opening the others are pushed in,

one after the other, until finally the whole hand is admitted. Entering the abdominal cavity with the palm of the hand turned upward the body of the uterus is felt, the bifurcation of both horns and by following one or the other, the ovary of the right and then of the left side is felt. Once located, their removal is simple, by the ecraseur."

The aftercare is that generally applied.

The article of Dr. Graub concludes by the consideration of the advantages and disadvantages of the puncture of the vagina being made below. These are related at some length from the *Swiss Journal of Veterinary Medicine* which is credited with the original article. The conclusions drawn in favor of the operation are that the practical success was not as good as the surgical. Of twenty-one castrated mares, thirteen became quiet and useful and were no longer a source of danger. The percentage of mares made valuable from the previous condition is very encouraging.

Lameness and Subcutaneous Malleination.—Since the introduction of the palpebral intradermo malleination for the rapid diagnosis of glanders, the subcutaneous method is resorted to only for some specific indications, when doubtful signs are present. If with the subcutaneous malleination the signs of positive reaction are the heat, general and thermic reaction, there are many circumstances where these diagnostic symptoms are not always present with the characters described and admitted as classical, and no matter what care may have been taken, numerous are the cases where the clinician is embarrassed in making a decisive diagnosis. There are conditions where such are essentially necessary, a suspicious animal is always a dangerous one. It is therefore of the utmost importance for the practitioner to take advantage of any element of diagnosis that may be known. He must be acquainted with it and not neglect to give it the value that it deserves in connection with the injections.

It is with this object in view that Veterinary Major Fayet has in a communication to the Societe Centrale, called attention to *Lameness as a Diagnostic Sign in Subcutaneous Malleination.*

'The lameness or better the stiffness of the leg, corresponding to the seat of the edema, following a subcutaneous injection, whatever may be its intensity, its mode of manifestation, is one of the signs which to this day seems to have escaped the attention of veterinarians

This lameness, in general proportional in intensity, with the extent of the edema, its size, soreness or presence of lymphatic cords, is principally expressed by the reduction in the extension of the leg. The animal drags its toe, as in cases of lesions serious and deep of the superior region of the leg. He immobilizes its scapular region, holds it backward and in walking, moves sideways so as to rest more on the opposite member. It is when brought out of the stable, that this condition is noticed most, it diminishes after a few steps and may not be detected, even when the animal trots.

With severe local reactions, on the contrary, when the edema is thick and wide, with or without lymphatic cords, it is very marked, the carrying of the leg forward is very painful and, often when the animal is made to move on a half turn on the opposite leg, it is very painful for him to do so. In these cases, the lameness improves very little, when walking or trotting.

When there are lymphatic cords, the lameness is very great and the scapular region seems to be the seat of great pain.

Therefore, intensity of lameness, sensation of pain felt by the animal, lateral displacement and mode of resting the leg, are in general subjects for clinical appreciation, but not always in proportion to the extent of the edema.

These diagnostic signs are correlative with the effects of the local reactions upon the corresponding lymph glands at the seat of the injection, on the prepectoral, axillary or pre-scapular."

Having given the description of these manifestations of various degrees of lameness, Mr. Fayet concludes that so long as the clinical signs, already observed in a great number of reactions, and by which many doubtful cases became positive, it is not unimportant to have the subcutaneous injection made any where, but in a proper place, viz: toward the inferior third of the neck, some centimeters from the superior border, at the widest part but rather far from the anterior border of the scapula. It is indicated that the practitioner should satisfy himself of the gait of the horse previous to making the injection.

This addition to the means of diagnosis, in some doubtful instances, is certainly of great value when joined to the manifestations obtained by the classical operation of malleination.

LONG VASTUS FIBROMA.—This is from a veterinarian in the Belgian army for which Prof. Cadiot has requested insertion in the *Bulletin of the Société Centrale.*

For Prof. Lineaux of Bruxelles the subject has been known for a long time, but the author has not seen any account of it in the more recent works in surgical pathology. All this taken into consideration justifies an extract from the original.

The expression *Fibroma of the Long Vastus* is no doubt better than the one *Fibroma of the Stifle,* although the latter is more explanatory of the seat of the lesion.

Fibroma of the long vastus is relatively rare. It is observed indifferently on draught or in saddle horses. Unknown in its etiology to the author, it has a constant seat, viz: the external face of the stifle region, opposite the inferior insertion of the long vastus (posterior portion of the superficial gluteus) upon the external patellar ligament.

The tumor is well defined on the region, seen full face principally during the flexion of the femoro-tibio-patellar articulation. It is apparent when examined from the side of the animal, and projects on the curve that the leg shows at that point.

The size may vary from that of a large nut to a mandarine or even an orange and has a more or less irregular globular form, being slightly flattened.

In an American mare, on which the author observed these neoplasms, there were four tumors arranged in the form of a square. In all the others he had seen, they were single; hard to pressure and painless. The environment of the tumor is well defined. The skin is movable over the growth and offers no cicatrix, recent or old.

It is difficult to appreciate by palpation the nature of the deep relations the growth may have and yet it is generally found that it has adhesions and may offer some surgical difficulty in its removal; although these are more apparent than real.

The fibroma of the long vastus does not give rise to any functional disturbances. To the esthetic point of view it is only an extremely unpleasant sight and is emphasized by the fact that it is a region where hydrarthrosis of the stifle appears. It is likely to give rise to error of appreciation which may be very unpleasant from a practical point of view.

Considerations of an esthetic nature are sufficient to justify an interference and to obtain the removal of the growth.

The operation required is the enucleation of the tumor. Operated standing, under cocaine, or in the recumbent position, the skin having been shaved and disinfected; an incision is made ver-

tically through the skin and the aponeurotic tissue underneath the tumor is thus exposed, secured with a pointed hook or forceps and dissected on its borders and deep face. If it is too large it may be divided in several pieces. Hemorrhage is of no consequence. The skin is secured and the wound closed with separate stitches. First intention cicatrization cannot be expected on account of the mobility of the region. The neoplasm seems to have its roots in the external face of the flattened tendon of insertion of the long vastus. Its removal does not involve the possibility of injuring the articular synovial sac. The tumor which is merely of white fibrous tissue, a lobulated fibroma, does not return after it has been taken off.

SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

VETERINARY RECORD, December 2.—(O) Snoring in a cow. A specific ulceration of the genital organs in sheep.—Prolapsus recti in a cow.

December 9th.—Strychnia Poisoning in Dogs.—(O) Interdigital Melanotic Tumor.—(O) Intussusception of small colon in horse.

December 23d.—(O) A curious case in a fowl.—(X) Vaccination for epizootic bovine abortion.

VETERINARY NEWS, December 9th.—(O) Invagination of the small intestine in a bullock.—December 16th.—Interesting post mortem.—Therapeutic notes.—December 23d.—(O) Abdominal tuberculosis.—(O) Cystic disease of the air sinuses.

VETERINARY JOURNAL.—December (X) Value of the intradermo-palpebral method for the diagnosis of glanders.—Effect of heat, burns and scalds in the human subject and domestic animals.—(O) Cyst of the epiglottis.—A long illness.—(O) Neuroma of the 5th pair of cranial nerves.—Imperfect hymen.—Tuberculosis in a cart horse.—Cyanide of potassium poisoning.—(O) Vesicle calculi in a cat.

IL NUOVO ERCOLANI.—November 30th.—(O) Alterations of the suprarenal capsule in various pathological conditions in domestic animals.—December 15th.—(O) Cardiac vertigo in a mule.

RECUEIL DE MÉDÉCINE VÉTÉRINAIRE.—November 15th.—Treatment of Epizootic lymphangitis by iodide of potassium.—(X) Case of morvo-farcinous affection.

BULLETIN OF THE SOCIÉTÉ CENTRALE.—(X) Autopyotherapy in veterinary medicine.—(O) Cocaine in retention of urine.

ANNALES OF THE PASTEUR INSTITUTE.—November.—Contribution to the study of delayed or latent tuberculosis infection.—New researches upon the contagion of tuberculosis by expired air during cough.

A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

ANAPHYLAXIS IN CATTLE AND SHEEP, PRODUCED BY THE LARVAE OF *HYPODERMA BOVIS*. *H. LINEATUM* AND *OESTRUS OVIS**

SEYMOUR HADWEN, D.V.Sc., AND E. A. BRUCE, V.S.

A preliminary note was published in the *Journal of the American Veterinary Medical Association* June 1916, on the first experiments conducted by one of us (S. H.) on anaphylaxis in cattle and sheep. These early results are included in this paper, with the later experiments which we have made together at Agassiz. We are publishing these results knowing that much remains to be done to clear up the exact nature of some of the reactions, the experiments, however, were started well on in the season for grubs and at the beginning of July had to be abandoned until next year, owing to lack of material.

The definition given by Muir and Richie (1910) of anaphylaxis is as follows:—"Anaphylaxis essentially consists in the development under certain circumstances in an animal of a hypersensitiveness to foreign albuminous materials which in themselves are not essentially toxic." "The common feature is that repeated injections of certain substances in sub-toxic or non-toxic doses,—a suitable interval of time elapsing between the injections,—may be followed by markedly toxic or even fatal symptoms."

The reactions we are describing while agreeing in the main with this definition, differ in as much that natural cases have been encountered where no injections had been given, the reaction being brought on by the rupture of Oestrid larvae within their hosts. Richet, (1910) for convenience divides anaphylaxis into acute and chronic forms. We quote the following:—"Chronic anaphylaxis, to indicate the accidents which follow a few hours after the unchaining injection." "Acute anaphylaxis is on the contrary that which is produced within the first hour." These two definitions describe the reactions we obtained in a very satisfactory manner, but the reaction coincides more closely with passive anaphylaxis, as the animal is in a receptive state when the first dose is given.

We would define the condition presented as a sensitiveness induced by warble larvae living in the tissues causing the host animal to become sensitive. When the larvae are removed from the

*Presented at the meeting of the A.V.M.A., Detroit, Mich., Aug. 21-25, 1916.

animal's own body (or from another's), and the protein material contained in the larvae is injected into the jugular of a sensitive animal, anaphylactic shock results. In natural cases we have proved that the rupturing of warble larvae in the animal's own back will produce the same result. Knowing the life-history of the larva, which penetrates the skin when it is less than a millimeter long, and from that time on lives within the tissues until it finally emerges from the back, enables us to say with some assurance that the larva having grown, nourished itself exclusively on animal tissues, must be composed of a substance resembling at any rate the tissues in which it has lived for a period of some ten months; though we must admit that these substances may have become modified within its own cuticle.

The material which causes sensitization would necessarily be caused by the larval excretions. That these larvae when crushed and prepared for injection contain little or no toxic material, is well established by the negative results obtained in animals of different species. Living within the connective tissues, *Hypoderma* larvae seem to occupy an unique position in parasitism as regards size. Their non-toxicity appears to be due, in part at least, to the food upon which they live,as in parasites of the intestines, such as the *Ascarides* and *Taeniae* toxic substances are found, which produce clinical manifestations of their presence.

The period of immunity and its duration following intra-jugular injections was not fully worked out, but four animals which received two or more injections, showed periods of immunity ranging from thirty days when a slight reaction was obtained, to an indefinite period. Three naturally immune animals which we encountered in our experiments prove that a long duration of immunity may occur.

Immune animals failed to react to the eye test. The interval between reactions in the eye tests was greater in animals which had received intrajugular injections; and in those which had not, the test could be repeated at very frequent intervals, the reactions obtained appearing to be nearly as severe each time the test was applied.

In sheep, the immunity judging from the few experiments we have made was the same as for cattle. One interesting result was obtained from the injection given to Lamb No. 1, proving that the

sensitiveness was inherited; in cattle we were not able to prove this point owing to lack of suitable material.

The amount of antisubstances present in the animals, presumably would be in proportion to the amount of sensitizing material contained in the excretions of the larvae, because anaphylaxis only occurs when the grubs have been broken in an animal or when a dose has been injected.

In the preliminary note already referred to, mention is made of a note by Ries (1916) on infectious pernicious anemia of horses, he quotes the Seyderhelms of Strasbourg who did some experiments with *Gastrophilus* larvae. They injected extracts of these larvae intravenously, the larvae having been collected from cases of anemia. In one case four larvae of *G. equi* were crushed and the filtrate added to 50 c.c. of salt solution, the mixture was injected slowly into the vein of a healthy horse which died in twelve minutes. Rabbits supported the same dose; dogs, mice, fowls, and pigeons were not incommoded by similar injections; pigs, sheep and cattle were equally indifferent.

Other horses were injected, one died in forty-eight hours after receiving the extract of three larvae. The larvae of *G. haemorroidalis* appeared to be more toxic than those of *G. equi* and a single larva caused death in twenty minutes. Other experiments were undertaken by these investigators, they proved that the imagos of these insects were also toxic, and they demonstrated to their own satisfaction that repeated small doses brought on anemia and finally death. Their conclusions are as follows:—"Anemia is not engendered by an ultravisible microbe but by *oestrine* a toxic substance produced within the bodies of *Gastrophilus*—larvae and insects—and especially those of the species *G. haemorroidalis.*"

Ries in commenting on these experiments says:—"I have myself insisted too much on the role of *Gastrophilus* —in toto—to contradict the statements of these authors: the anemia of Lorraine and the adjoining country, in the great majority of cases can not have any other origin, but it is not impossible that this is not the case in other regions." This in brief summarises the article to which reference has been made. The conclusions arrived at by the authors can scarcely be considered logical, and we believe that the theory of *Gastrophilus* being the transmitter of infectious anemia, can be upset, simply on the grounds that these flies are ubiquitous and infectious anemia is not. It was owing to this

article, however, that the experiments were undertaken to discover what effect the injection of *Hypoderma* larvae would have upon cattle.

There is no question that the repeated injections made by these investigators brought on some form of anemia, but judging from the results of American workers a single injection of blood from a true case of infectious pernicious anemia into a susceptible animal, is all sufficient to reproduce the disease in a given time. The sudden deaths after intravenous injection and the non-toxic effect of the same material in other animals would indicate that the results obtained were of anaphylactic shock and not of infectious anemia.

Method of preparing extracts used in experiments. The larvae were squeezed out of the warbles and were immediately washed in pure running water. They were handled in as cleanly a manner as possible and were cut into small pieces with sterile scissors, the juice was then squeezed out of them through a piece of cloth and sterile salt solution was poured over the skins to remove as much of the extract as was possible. The larvae were weighed before they were broken, and afterwards the skins, which enabled us to determine the exact dosage. The extract was injected as soon as possible after it was prepared, otherwise oxidation was found to occur and it would change color. A number of microscopic examinations were made of these extracts and for the most part it was difficult to find bacilli. This proves that the bodies of the larvae did not contain bacteria, at any rate in any numbers, and the few we did find were probably adherent to the cuticle and came from the pus in the warbles. The eye extracts were prepared in a different way; the larvae were washed as for injection and were simply punctured in several places, the clear fluid which exuded when the larvae contracted was collected and used in these tests without dilution.

Protocols of the experimental injection of extracts of Hypoderma larvae. (Fatal cases).

Experiment with H. lineatum, April 16, 1916. Heifer No. 5. Eight larvae of *H. lineatum* were injected in 40 c.c. of salt solution into the jugular. Before the dose was fully injected the heifer's eyes and nose were changing color. The breathing then became fast and labored, the animal's tongue protruded, strings of saliva were seen and tears came from the eyes. The animal next defecated and dribbled urine. Clear mucus came from the rectum.

The anus strange to say in the short time the animal lived, was slightly swollen. The body turned a livid purplish color. After a few convulsive struggles to gain its breath the animal fell, it made a few more efforts to breathe, then died. All this occurred in less than five minutes. The heifer coughed a few times soon after the injection was made, and a distinct rattle of mucus was heard in the trachea.

Autopsy:—Just after death. All the white parts of the body were cyanosed. The urine was dribbling, the anus partly everted and mucus dropping. The mucous membranes were of a purplish color. Bloating was very rapid. The jugular veins stood out hard and tense. The blood was of a dark venous color. The posterior aorta was collapsed and empty showing that the right side of the heart was overburdened. The lungs were full of air and were congested, the trachea and bronchi were filled with bloody froth, and the mucous membranes were covered with petechiae. (Fig. 1). Congestion was general throughout the body, except in the case of the spleen and liver. The blood had completely lost its clotting property and remained fluid until putrefaction set in two days later.

Experiments with H. bovis, April 28. Cow No. 7. Injected the fluid contained in about three and a half larvae of *H. bovis* into the jugular. The dose which had been prepared was of the extract of five larvae, these weighed 5 grams, the skin weighed 1.8 grams, which equals 3.2 grams of extract, this was diluted in 30 c.c. of salt solution and 20 c.c. was injected in one syringeful. This dose had hardly been given when the animal showed symptoms of anaphylactic shock, the remainder of the dose was therefore withheld. She held her head back, began to salivate, tears came to the eyes. The cow was then let loose, stumbled out of the stable, went about fifty yards and dropped dead. The body twitched for a minute or two longer. Death must have taken place in about three minutes.

Autopsy:—Bloating began at once. The lesions encountered were similar to those of cow No. 5, the only additional lesions found were in the intestines, the mucous membranes being covered with petechiae. The anus became everted soon after death and bloody mucus dropped from it.

This cow's blood coagulated in 19 minutes prior to the injection. After death it had completely lost its clotting power.

Experiments with H. bovis, May 30. Cow No. 8.—Six larvae of *H. bovis* weighed 7.2 grams, the skins weighed 2.4 grams, which equals 4.8 grams in 20 c.c. of salt solution. Injected into the jugular, death occurred in 2¾ minutes. The first symptoms (as in other cases) were belching and shaking of the head, in one minute the eyes watered freely, salivation, breathing labored, dribbling of urine, coughing, and then blood stained saliva came. Facial respirations noted, the cow staggered and fell over dead. (Figs. 2-3-4). Blood taken before injection set in 27 minutes, but the sample taken immediately after death did not set and was still fluid three days later.

Autopsy:—Hemorrhages into the lungs, bright red clots were found in the trachea and a few venous clots in the lungs. The left side of the heart was empty, the right side was filled with non-coagulable blood, as also were the jugulars. The small intestines showed numerous red patches on the mucous membranes, the anus was everted and blood stained feces were passed.

Note:—The coagulation of blood in trachea and bronchi was probably due to the rapidity in which the hemorrhages occurred, i. e., before all oxygen was taken from the blood.

Notes on three fatal cases of anaphylaxis. One case resulted from the intra-jugular injection of the larval extract of *H. lineatum* and two from *H. bovis.*

The outstanding feature is the rapidity with which death occurred; symptoms of asphyxia were almost immediate. Hemorrhages occurred in all three cases, chiefly of the respiratory tract but also in the alimentary system. The bloody evacuations are somewhat suggestive of anthrax.

In all three cases the blood taken after death had completely lost its clotting properties. When freshly removed it was of a dark venous color, later red streaks would be seen on its surface, showing that some reabsorption of oxygen was taking place. In the hemorrhages which were found in the trachea the redness of the clots was no doubt due to the rapidity with which they were formed; or in other words, the vessels had ruptured and the blood had been coughed up into the trachea, before it had been fully acted upon by the influences at work which caused the remainder of the blood to become incoagulable. Presumably then the rupture of the vessels was caused primarily by excessive blood pressure.

PROTOCOLS OF THE EXPERIMENTAL INJECTION OF EXTRACTS OF HYPODERMA LARVAE. (Non-fatal cases).

Steer No. 1, March 31st. The extract of three larvae of *H. lineatum* in 50 c.c. of salt solution was injected into the jugular. In a few minutes the animal began to cough and to slobber at the mouth. Tears formed and the eyelids swelled. Feces were passed and the anus became edematous. Breathing was rapid, the animal looked thoroughly tired out. There was frequent urination. The injection was made at 3:30 P. M., and at 10 P. M. the animal looked normal again.

April 17th. A drop of warble extract was injected into the anus, with no appreciable result.

May 11th. Two larvae of *H. bovis* were squeezed out of this animal's back and an extract made from these was injected into the jugular. The larvae weighed 2.2 grams, the skins .6 gram, equals 1.6 of liquid injected. No result from the injection.

June 1st. A drop of warble extract was placed in the eye, with no results.

June 17th. A drop of extract obtained from warble-flies was injected into the eye with no result.

Bull No. 2. April 1st. The extract of four larvae of *H. bovis* in 50 c.c. of salt solution was injected into the jugular. The effect was apparent in five minutes. Cough, salivation, tears, gassy feces, and clear mucus passed from the anus. Edema of eyelids and anus, skin cyanotic, frequent defecation and urination, the urine came in drops. Temperature at 6:00 P. M., 102°, the animal still distressed and discharges apparent. The injection was made at 3:15 P. M.

April 17th. A drop of warble extract was instilled into the eye, with no result.

May 23rd. Four larvae of *H. bovis* were squeezed out of his own back, these weighed 2.7 grams, the skins .6 gram, which equals 2.1 grams of extract, which was diluted in 20 c.c. of salt solution and injected into the jugular. Symptoms developed instantly, salivation and then tears, defecation, dribbling of urine, the rectum turned a violet color and bloody evacuations with clear mucus were noted. The eyelids and anus swelled, the animal walked hesitatingly, the testicles were drawn up and the skin looked thicker than normal. The sheath swelled and wrinkled. The animal coughed. Two and a half hours after injection breathing was spasmodic and stertorous. Recovery.

June 7th. A few drops of extract were injected into the eye and anus. Three minutes after injection the animal was licking itself, and showed some irritation but the eye did not swell.

June 30th. A few drops were injected into the eye and the nostril at 11:42. He immediately sneezed, then urinated, licked his nose, tears came and at 11:48 was licking his body all over.

Steer No. 3. April 3d. The extract of four *H. lineatum* and four *H. bovis* larvae (some small) was injected into the jugular in 60 c.c. of salt solution. The injection took place at 3:15 P. M. and at 3:30 the steer got uneasy, began to smack his lips and to froth at the mouth. Cough, salivation, tears, the animal shook its head and became agitated. The eyelids swelled so that his eyes were barely visible. The body color turned purplish where the skin was white. Temperature before injection 101°, at 4:30 P. M. 99.6°. The anus (Fig. 5.) and eyelids swelled and the skin became shiny. The nostrils were swollen and the breathing became heavy, the animal snored. Eructations of gas heard. The steer was much better at 6:00 P. M. All the grubs of *H. lineatum* had left this animal, *bovis* had not yet appeared.

May 10th. Five larvae of *H. bovis* (four large and one small) were taken from the animal's back, crushed, filtered, and returned into the jugular with 20 c.c. of salt solution. The larvae weighed 4.1 grams, the skins .6 gram. The fluid injected was 3.5 grams. Injection at 10:33. At 10:53 the symptoms had become well marked. The effect of the injection was nearly as severe as it was from the first, except for the breathing which was easier. One additional sign noted was itching, the animal scratched one eye with its foot. This symptom may have been overlooked in the previous experiment. The animal recovered quicker from this dose, and at 3:00 P. M. very little remained of the edema.

Steer No. 4. April 12th. Eight larvae of *H. bovis* were broken under the skin on the animal's back. (This animal had only been exposed to the attacks of *H. bovis* during the preceding summer). The operation took 24 minutes, and it was not possible to tell exactly whether the larvae were properly crushed in all cases. Ten minutes after the last larva had been crushed, it was noticed that the steer was frothing a little at the mouth, and that his eye was dull, he also swallowed a great deal and his lips twitched. A little later when the animal was turned out of the stable he became very excited, and ran about the field. Tempera-

ture before the experiment 101.8°, two and a half hours later 101.7°. The symptoms though they were slight were definite.

April 13th. Ten warble larvae were broken on this animal's back, which took twenty minutes, with no appreciable results.

April 17th. A drop of warble extract was instilled into the eye with no result.

April 19th. The extract of three larvae of *H. lineatum* in 20 c.c. of salt solution was injected into the jugular, without effect.

April 22nd. The extract of four larvae of *H. bovis* in 20 c.c. of salt solution was injected into the jugular without effect.

May 10th. Four larvae of *H. bovis* weighed 4.8 grams, the skin 1 gram, equaling 3.8 grams of warble extract; this amount was injected into the jugular in 20 c.c. of salt solution. The results were negative.

June 7th. A drop of warble extract was instilled into the eye, in two minutes the animal was rubbing his eye and tears came, but there was no swelling of the eyelids.

June 9th. Five *H. bovis* weighed 5.1 grams, skin 1.5 grams equals 3.6 grams of extract, which was injected into the jugular, in 30 c.c. of salt solution. Slight symptoms were noted consisting of twitching of lips, cough, and slobbering. No eye symptoms.

Cow No. 6. April 27th. The extract of four larvae of *H. bovis* in 20 c.c. of salt solution was injected into the jugular. There were no definite signs of a reaction.

June 1st. A drop of warble extract was placed in the eye, with no result.

June 17th. A drop of extract from an *H. bovis* fly was instilled into the eye with no result.

June 30th. A drop of warble extract was placed in the eye, with no result.

Cow No. 9. June 14th. This animal was a tubercular suspect. Seven *H. bovis* larvae weighed 10.1 grams, skins 4.1 grams, equaling 6 grams of extract, this was injected into the jugular in salt solution to make 20 c.c. Injected at 10:47, slobbering started at 10:53, animal itchy and licking herself at 10:56. Belched, licked, and coughed at 11:02, at 11:04 the symptoms were more marked, she scratched both eyes with her hind feet. Yawned at 11:05, and coughed. The skin appeared edematous and wrinkled all over the body, (Fig. 6) markedly so around the eyes, (Fig. 7) neck and udder. Tears came at 11:07. Respirations very fast. At 11:10 the

vulva and anus were swollen and purplish in color; at 11:13 dribbling urine, respirations faster, slobbering increased, eyes swollen, 11:20 animal shot. Blood taken from the jugular immediately after death, beginning to coagulate at 11:43. Clots formed on the ground around the carcass. The wrinkling of the skin smoothed out after death. No larvae of *H. bovis* or any evidence of their presence was noted, but old lesions of *H. lineatum* were numerous. On post mortem all organs looked normal, except for a watery condition of the lymphatic glands, and a marked congestion of the respiratory tract.

Cow No. 10. June 17th. Eight larvae of *H. bovis* taken from cow's own back. Weighed 9.1 grams, the skins 2.7 grams, making 6.4 grams of extract in 20 c.c. of salt solution, were injected into the jugular at 12:08. The cow yawned at 12:09, then gasped, yawned again, dribbled urine, tears came, and eyes began to swell at 12:11. Dribbling urine and defecation at 12:13. Signs of great itchiness at 12:14. Udder getting wrinkled, and urinated at 12:15. Defecated again, slobbering, breathing labored, tears, and cough by 12:20. Clear mucus from the anus 12:22. Bloody feces 12:27. Vulva swollen. Respirations at 12:30 were 98. The animal kept walking backwards. At 1 P. M. she was lying down and the discharges were ceasing, other symptoms were not abated. At 4:00 P. M. she was apparently well. (Fig. 8).

June 28. A drop of warble extract was placed into the eye at 6:18, the cow scratched her eye at 6:20, eye watering and licking her self all over at 6:21.

June 30th. A drop of extract was placed into the eye, and two or three drops into the vagina at 12:03, cow scratched her eye at 12:04 and started licking her legs and body. The vagina became inflamed.

Cow No. 11. July 5th. Eleven *H. bovis* larvae weighed 15.5 grams, the skins 5.55, making 10 grams of extract, which was injected into the jugular in 40 c.c. of saline. No result from the injection. The animal started to eat grass as soon as released. The eye was also injected with absolutely no results.

Notes on eight non-fatal cases injected with Hypodermal extracts.

Six of these animals showed symptoms of anaphylaxis after injection.

Two animals, Nos. 6 and 11, proved to be immune both to intrajugular and eye tests.

The experiments on Steer No. 4 are interesting on account of the fact that this animal was only exposed to the attacks of *H. bovis* the preceding summer, and had become immunized to *H. bovis* extract by having had larvae crushed in his own back. To prove whether an animal was sensitive to one or both species of larvae, an injection of *H. lineatum* extract was made, without effect. Apparently then there is no difference between the composition of the fluid derived from *H. bovis* or *H. lineatum*. It is interesting to note that the immunity held by this animal was apparently breaking down, as after a space of twenty-eight days a slight eye reaction was obtained, and on the thirtieth day an intrajugular injection brought on slight systemic symptoms. With the exception of Steer No. 3 which became somewhat unthrifty after a second injection, none of the animals seemed to suffer any after effects. No elevation of temperature was recorded in any of the above cases, and although only a few temperatures were taken the animals were closely watched and none of the symptoms usually seen in fever were observed. The after effects of the injections as regards contamination were negligible, only one abscess developed which was on the neck of steer No. 4 and was possibly due to the introduction of skin bacteria.

PROTOCOLS OF NATURAL CASES OF HYPODERMAL ANAPHYLAXIS.

February 12th, 1916. Cow aged 7 yrs. Owned by the Experimental Farm at Agassiz, B. C. On being liberated after prolonged confinement she became very excited, ran about and broke through a wire fence, returning through the same opening she had made. The cow was then brought into the stable. The animal's back was badly scratched. The symptoms which appeared rapidly were as follows: running from the eyes, swelling of the eyelids. anus, and the vulva. The white parts of the skin were of a purplish color. Temperature normal.

Treatment. The animal received a dose of Epsom salts, and four hours later the cow had practically recovered and was feeding. The diagnosis made by one of us (S. H.) was of heart trouble.

Heifer 2 yrs. old. February 19th. This case occurred also at Agassiz, but was not seen by us. We are indebted to Mr. Moore, Superintendent of the Experimental Farm for the following notes: No history of injury, but the animals had been turned out after a

weeks confinement and had been taking violent exercise. The symptoms were first noted when the heifer was being stabled, and were as follows: running from the eyes, vaginal and anal swelling, udder and skin wrinkled, flatus and bloody feces. The animal strained a great deal and bellowed as if in pain. Temperature normal. The heifer remained down for two hours, breathed with her mouth open and her tongue hanging out. Evidently it was a very nearly fatal case. On the following day the animal appeared normal.

Report from Inspector J. D. Paxton of Kamloops, B. C. On May 13th, a cow presented the following symptoms: Swellings of eyes, anus and vulva, also wrinkling of the skin in different parts of the body. Breathing was labored. Recovery was rapid.

Dr. Paxton also recalled a case he had seen in a cow which was rapidly fatal following a somewhat severe beating over the back.

Dr. F. W. Ottewell of Ladners, B. C., reported two cases in cows. The cases occurred in the spring; he noted swellings especially around the anus and udder. Both animals had difficulty in breathing and their eyes were swollen.

Dr. J. W. Darby of Mission, B. C., on being shown photographs of affected animals, said he had encountered such cases while practicing in New York State.

Notes on cases occurring in nature. The foregoing natural cases require but little comment, except to emphasize the fact that the disease occurs under natural conditions, and perhaps more frequently than we are aware. The fatal cases which may occur would scarcely be diagnosed before death, in view of its extreme rapidity. This may explain the nature of some of the deaths occurring in the spring of the year, often attributed to anthrax and in which no bacilli are demonstrable.

PROTOCOLS OF THE EXPERIMENTAL INJECTION OF AN EXTRACT OF OESTRUS OVIS LARVAE.

Sheep No. 1. April 18, 1916. Four larvae of *Oestrus ovis* weighed 1.2 grams, the skins weighed .25 gram. ca, the extract from these was placed in 20 c.c. of salt solution and injected into the jugular. The injection was made at 3:31 P. M., the sheep died at 3:46 P. M. The dose was not fully injected when the animal gave a deep sigh, by the time it was fully in the sheep was frothing at the mouth. The nostrils were turned up and wrinkled. The sheep got up and defecated, it stood still and put its nose out straight and breathed hard, frothy mucus dribbled from the mouth.

The skin and mucous membranes assumed a purplish color. It then staggered about and fell, got up again, violent tremblings occurred and the breathing became more labored, the tongue was protruded. After making a few more attempts to get its breath it fell over dead.

Autopsy:—The lungs and all the adjacent glands were engorged with dark venous blood. The mucous membranes of the trachea and bronchi were much congested. The posterior aorta was empty. The blood was incoagulable. Prior to the injection a sample of blood taken set in 7.5 minutes. Four larvae of *Oestrus ovis* were found in the head.

Sheep No. 2. April 29. The extract of two larvae of *Oestrus ovis* weighed .4 gram. The larvae weighed .5 gram, and the skins .1 gram. The extract was injected into the jugular in 20 c.c. saline solution. Symptoms of anaphylaxis were noticed at once, the animal frothed at the mouth and tears were seen. The sheep staggered about and threw itself down, its skin became cyanotic and there was great difficulty in breathing. (Fig. 9). Respirations 70 to the minute. Later the discharge from the nostrils became very heavy and strings hung from its mouth. (Fig. 10). The sheep gave a grunt about every twelfth breath and swallowed a great deal. There was a rattling sound of mucus in the trachea. The injection was made at 11:09 A. M. and at 1 P. M. the sheep was easier, though it still looked very ill. At 6 P. M. the animal was much better and walked fairly well; she even tried to run. The skin was still somewhat cyanosed and the respirations 30 to the minute. The blood taken before injections set in 8 minutes; the incision which had been made in obtaining it, started to bleed afresh after the injection had been made.

Sheep No. 3. May 1. Oestrus ovis larva weighed .2 gram., the skin weighed .15 gram. and the extract .175 gram. The extract in 5 c.c. of salt solution was injected into the jugular. The sheep frothed at the mouth immediately the dose was in, and died in less than 15 minutes. Blood taken prior to the injection set in under 15 minutes. After injection the blood was incoagulable, and remained fluid until putrefaction set in.

Autopsy:—The lungs and adjacent glands as in the previous case were engorged with blood, and numerous petechiae were seen in the lungs. No *Oestrus ovis* were found in this sheep.

Lamb No. 1 May 9. The extract of one *Oestrus* larva was injected into the jugular, in 5 c.c. salt solution. The larva weighed .2 gram. The injection was made at 10:30 A. M. Symptoms were immediate, the lamb defecated, it then began to salivate, its skin turned a purplish color and the breathing was labored, the animal opened its mouth. In about 15 minutes the breathing became almost suspended, the abdominal muscles were called into play. At 1 P. M. the lamb had almost recovered and drank milk. The blood taken before injection set in 5 minutes, 20 minutes afterwards another sample was taken which took 23 minutes to set, when drawn it was of a venous color but gradually it became redder and looked like normal blood when it had set. (Fig. 11).

June 5th. The fluid extract of one *Oestrus ovis* larva was dropped into the eye with no results.

Lamb No. 2. June 5th. The fluid extract of one *Oestrus ovis* larva was dropped into the eye with no results.

June 7th. Two *Oestrus ovis larvae* weighed .55 grams, the skins .25, giving .3 gram. of extract, which was injected into the jugular in 5 c.c. of saline with absolutely no result.

Notes on sheep experiments. The symptoms in sheep are almost identical with those in cattle, but a difference will be noted, i. e., the swelling of the eyes and the anus were wanting. It will be noticed that the eye tests were unsuccessful, but the animals experimented upon were immune, one having received a jugular injection previously, the other being naturally immune.

OPHTHALMIC AND OTHER LOCAL REACTIONS WITH FLUID FROM WARBLE LARVAE.

Steer No. 12. May 30th. A drop of warble extract was placed in the eye. The animal immediately scratched the eye with the foot, and rubbed it. There was salivation and running from the nostrils. He licked himself especially over the areas of hypodermal rash. Coughing and yawning was also noted. (Fig. 14).

June 3rd. Injected a small drop of extract into the anus, following which there was pruritis and a little swelling, lasting about three hours.

June 6th. Injected a few drops of extract into the anus at 4:40. Five minutes later the steer was licking himself, and the anus was very irritable. About an hour later the anus was examined and found swollen.

June 17th. A drop of extract from an *H. bovis* fly was placed

in the eye, irritation was shown, the animal was scratching his eye in one minute and the membrana nictitans was passed over it.

June 30th. A drop of warble extract was instilled into the eye at 11:30, tears came in one minute, at 11:34 the anus was injected, owing to the animal's movements a little spray went upon the anal orifice, in a short time small round swellings were seen. There was great irritation, the rash was nearly gone at 12:13.

Cow No. 13. May 30th. A drop of warble extract was placed into the eye. Symptoms noted were, tears, swelling of conjunctiva, irritation, scratched eye with foot, licked herself, salivated, and ran from the nostrils. The symptoms disappeared inside of two hours.

June 30th. A drop of extract was placed into the eye at 11:37, tears came at 11:39, a drop was placed upon the vulva at 11:35, tail switching, and irritation at 11:36. Vagina inflamed at 11:44 and the tail was held in tightly.

Cow No. 14. June 1st. A drop of warble extract was instilled into the eye, tears flowed at once and there was great irritation, the animal licked herself all over especially on the areas of hypodermal rash. Membrana nictitans passed frequently over the eye and a severe conjunctivitis developed, which lasted for several hours, mucus ran from the nostrils. (Fig. 12).

June 3rd. Placed a drop in the opposite eye, the reaction began in one and a half minutes, tears and nasal discharge as before, the reaction lasted over six hours.

June 17th. A drop of extract was placed in the eye, at 8:35 swelling noticed at 8:40, conjunctivitis and licking of body at 8:45.

June 30th. A drop was placed into the eye and nostril at 11:38, at 11:40 there was blowing through the nose, persistent licking of the nostrils, and slobbering. The eye symptoms were not as severe as in the preceding tests.

July 7th. Injected a drop of extract into the eye, at 5:40, tears in one minute. At 6:05 the eye was watery and the conjunctiva swollen, the eye partly closed, and the membrana nictitans prominent.

Heifer No. 15. June 1st. Two drops of warble extract were placed on the lips of the vulva. The animal began at once to switch her tail and to lick herself all over. The mucous membranes of the vulva which previously were pale, became a fiery red. The irritation lasted for about three hours.

June 7th. A few drops were put into the eye and vagina. In one minute she was scratching the eye with her foot, and licking herself all over, irritation of vulva evinced by tail movements. The reaction was severe, slobbering and tears occurred and the animal did not return to the normal for several hours.

June 17th. A drop of extract from an *H. bovis* fly was injected into the eye. The heifer scratched her eye in one minute.

June 30. A drop of warble extract was put into the eye at 11:30. (Fig. 13). Tears, conjunctivitis, and bodily irritation followed almost immediately. A drop was also placed into the vagina at 11:33 and inflammation was well marked at 11:45.

Heifer No. 16. June 3d. A drop of warble extract was placed in the eye with no effect.

June 30th. A drop was placed into the eye, the animal scratched the eye in two minutes, the reaction, however, was slight, no other symptoms being noted, possibly the scratching was due to some other cause.

Control tests on other animals with warble extracts. Two horses were injected in the eye without results. Four pigs were injected similarly without results. Two lambs received eye injections without effect. Eight rabbits were also negative to the eye test.

OPHTHALMIC REACTIONS WITH FLUID FROM *Gastrophilus equi* LARVAE.

Horse. July 17th. An extract of *G. equi* was prepared from two larvae, the clear fluid which exuded after puncturing was employed. One drop was instilled into the eye at 10:11 A. M., followed immediately by shaking of the head and blinking. The membrana nictitans was repeatedly passed over the eye. Tears in one minute. Rubbing eye on leg at 10:14. Eye closing, activity of membrana nictitans, swelling, rubbing again, tears becoming mucilaginous. At 10:30 the eye was nearly closed. At 3:15 P. M. eye still swollen contains sticky mucus. At 6:45 P. M. the eye still partly closed, but the swelling going down fast. (Fig. 15).

Control tests. Two cattle, Cow No. 13 and Steer No. 12 were used as controls; both these animals were highly sensitive to warble extract, but two full drops of *G. equi* had absolutely no effect upon them.

July 19th. The experiment of July 17th was repeated on the same horse, the opposite eye being injected. The results were identical. A few drops were sprayed upon the anus, resulting in

irritation and swelling. Cow No. 10 was used as control with negative results.

Notes on the ophthalmic experiments. It will be observed that the eye reaction did not occur in animals which were immune to intrajugular injections. The control tests were made on a variety of animals, including horses. The reactions obtained in a horse with *G. equi*, strengthens the control tests and demonstrates the specificity of the reaction.

EXPERIMENTAL INJECTION OF WARBLE EXTRACTS INTO RABBITS.

Two rabbits, Nos. 1 and 2. April 17th. The fluid extract of eight larvae of *H. lineatum* amounting to about 4 c.c. was diluted to make 20 c.c. in salt solution. 10 c.c. was injected into the peritoneum of two rabbits. There were no after effects.

April 27th. The rabbits were reinjected with about the same dose. One rabbit showed signs of severe shock, the other to a lesser extent.

Two rabbits, Nos. 3 and 4. May 30th. 3.5 grams. of *H. bovis* extract in 10 c.c. of salt solution was injected intraperitoneally into each rabbit. No toxic effects were noted.

June 28th. Rabbit No. 3 received an intraperitoneal injection of 4.10 grams of *H. bovis* extract in 10 c.c. of salt solution, at 5:38. The eyes were watering at 5:46, breathing fast at 6:02. Lying in a corner and appeared ill at 6:06 the genitals dark colored and swollen. Recovered.

June 30th. Rabbit No. 4 received an intraperitoneal injection of 7.70 grams. of *H. bovis* extract in 20 c.c. of salt solution at 2:57, in one minute there was sniffling, licking himself all over, biting tail and body, appeared very itchy. At 3:05 he was lying down stretched out and quiet. Recovered slowly.

Eye test on rabbits 3 and 4. June 17th. A drop of *H. bovis* extract was injected into the eye of each rabbit. No. 3 showed slight effects such as blinking and a peculiar turning up of the eyeball. No. 4 showed the membrana nictitans and the eye was watering ten minutes after injection, the eye-ball also turned up.

Control rabbit. Showed no effects from injection.

EXPERIMENTAL INJECTION OF WARBLE EXTRACTS INTO GUINEA-PIGS.

Guinea-pigs, Nos. 1 and 2. April 17th. 2.5 c.c. of warble extract from 5 *H. lineatum larvae* in 30 c.c. of saline solution. The amount was divided into two and injected intraperitoneally. There were no toxic effects.

April 27th. Injected 1 c.c. of *H. lineatum* in salt solution into each guinea-pig. No. 1 became ill and shivered. No. 2 showed no effects.

Guinea-pigs, Nos. 3–4–5–6. May 30th. Each Guinea-pig received 5 c.c. intraperitoneally of a solution of 6.4 grams, of *H. bovis* extract in 20 c.c. of salt solution. No immediate effects from the injection.

June 2nd. Guinea-pigs 3 and 4 died of septicemia.

June 28th. Guinea-pig No. 5 received 2 grams. of *H. bovis* extract in 5 c.c. salt solution, intraperitoneally, at 5:41. Cough and twitching of the mouth at 5:46, front feet itchy and biting same, scratched eye, eyes partly closed and very itchy, at 5:47. Animal looks ill 5:55. White parts of the skin cyanosed at 6:10. Died between 8 and 10 A. M. next morning.

Guinea-pig No. 6 received the same dose as No. 5. Injection at 5:42. Cough and mouth movements at 5:46, front feet and body itching, stretched out on belly, 5:54. At 5:57 scratching all over, 6:15 lying down, eyes watery. Died at 2:45 P. M. next day.

Guinea-pigs, Nos. 7 and 8. June 1st. Received 2 grams. each of *H. bovis* extract in 5 c.c. of salt solution, intraperitoneally. No immediate effect.

June 30th. Guinea-pig No. 7 received 3.65 grams. of *H. bovis* extract in 5 c.c. saline solution intraperitoneally at 3:02 P. M. At 3:15 animal very quiet, died at 7 A. M. next morning.

Guinea-pig No. 8 received the same dose as No. 7 at 3 P. M. At 3:10 was very uneasy and scratching, at 3:12 lying quiet. At 3:18 was scratching and biting himself all over. Found dead at 7 next morning.

EXPERIMENTAL INJECTION OF OESTRUS OVIS EXTRACTS.

Guinea-pigs, Nos. 9 and 10. April 19th. The fluid extract of four *Oestrus ovis* larvae in salt solution was divided into two doses, and injected intraperitoneally. There were no immediate results.

April 29th. 1.3 grams of extract in salt solution was divided into two doses and injected intraperitoneally at 10:45 A. M. Both guinea-pigs became ill, and at 6 P. M. were very weak. They were both found dead next morning.

Notes on Rabbit and Guinea-pig experiments. The reason for the preliminary doses being so large was to prove that the extract used was non-toxic, and also that it did not contain an excess of

contaminating bacteria. No animal died of acute anaphylactic shock. Six out of eight guinea-pigs died the day following the second injection. Two other guinea-pigs died of sepsis, but in this case the larvae used for the injections were dead and properly speaking should not have been used for that purpose.

SUMMARY

Anaphylaxis has been reproduced in cattle, sheep and small animals, with extracts of the larval forms of *H. lineatum*, *H. bovis*, and *Oestrus ovis.*

The "acute and chronic" forms have been reproduced; coinciding with Richet's definition.

The reactions can be induced by crushing and returning an extract of an animal's own larvae into the jugular, showing that larvae living in the animals make them receptive.

Natural cases of anaphylaxis are described where no injection had been given, and where injury had ruptured the larvae subcutaneously, liberating their contents in sufficient quantity to produce shock.

A paper by Ries is reviewed in which the author ascribed the cause of infectious anemia as being due to *Gastrophilus sp*: it seems probable that he was dealing with reactions such as we describe.

Animals which had recovered from the reaction were found to be immune for varying periods.

The symptoms in "acute" anaphylaxis were immediate; the first noticeable sign being an extremely tired look, succeeded almost immediately by salivation, tears and defecation, then by signs of asphyxia, and death. In the "chronic" form the symptoms were a little less rapid and not so severe, in addition there were edemas especially of the eyelids and anus, and marked irritation of the skin.

Small animals were sensitized with warble extracts and showed signs of anaphylaxis following the second injection.

Eye and other local reactions were obtained with extracts applied to the mucus membranes. In cattle the reaction was specific for extracts of *Hypoderma,* and in a horse for *Gastrophilus.*

It would appear probable that similar reactions will be obtained in other animals with their own parasites.

Note: We are indebted to Dr. F. Torrance, Veterinary Director General, Canada for permission to publish this paper.

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Fig. 1. Trachea of Heifer No. 5, showing petechiae

Fig. 2. Cow No. 8, just after the injection had been given. Note strings of bloody mucus.

Fig. 3. Cow No. 8 in act of falling.

Fig. 4. Cow No. 8 breathing her last. Note blood in mouth.

Fig. 5. Steer No. 3. Œdema of anus.

Fig. 6. Cow. No. 9. Note wrinkling of skin.

Fig. 7. Cow No. 9. Note wrinkling.

Fig. 8. Cow No. 10.

Fig. 9. Sheep No. 2. Anaphylactic shock.

Fig. 10. Sheep No. 2. Note heavy discharge which appeared later in the reaction.

Fig. 11. Lamb No. 1.

Fig. 12. Cow No. 14. Note swelling of conjunctiva.

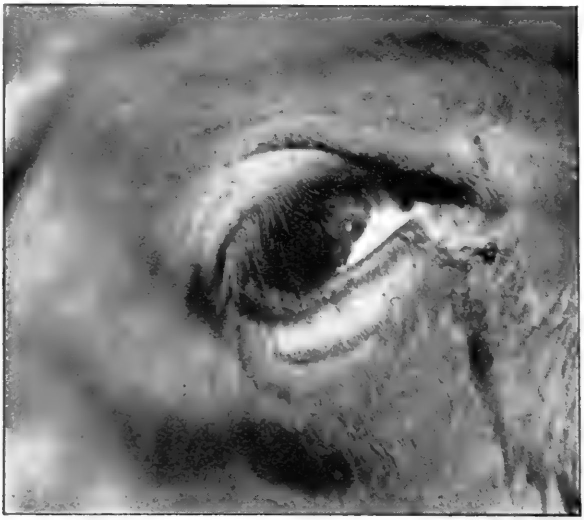

Fig. 13. Heifer No. 15. Eye reaction.

Fig. 14. Steer No. 12. Eye reaction.

Fig. 15. Horse. Eye reaction with *G. equi* extract.

DISCUSSION

Dr. Reichel: I would like to ask Dr. Hadwen just what he meant by referring to some animals as immune. I could not quite get the connection of the expression of reaction in regard to immunity which he made several times.

Dr. Hadwen: After an animal has been injected one finds a degree of immunity to a reinjection. Sometimes it appears to be quite fixed, so to speak. We found three naturally immune animals in the course of our experiments; the injections had absolutely no effect upon them at all. In the case of animals that had been injected, we found reinjections, if they were made after a short interval of time, had no effect whatsoever, at least no apparent effect. We had one slight reaction after about a month; with others after a longer period. We cannot give the minimum or maximum time required.

Dr. Giltner: I take it this is a diagnostic test; but I would like to ask if you were able to prepare an agent that you could instil into the eye, and keep it for long periods of time; also if there is any therapeutic property in your injections.

DR. HADWEN: As for the therapeutic property, I do not know anything about that at all; I cannot tell yet. We have not done enough work. As for diagnosis I think it is absolutely all right. I am not at liberty to tell you exactly what happened, but I had a talk with Dr. Ransom in Washington the other day. He has been doing some work which will be published. Dr. Eichhorn I think may be able to throw a little light on it because he also told me that one of his men had done some work recently, since reading my first little note which was published in our proceedings.

DR. GILTNER: Could you transport the diagnostic material and keep it for long periods of time?

DR. HADWEN: I have not tried. I have always used living larvae, but if the larvae are allowed to die, they soon go wrong, and one does not know what he is doing if he uses them.

DR. J. W. CONNAWAY: It would seem that the diagnostic value of this might be called into question so far as the grub was concerned; the sheep and the lamb showed some reaction, possibly from heredity. It would be a matter of how long that lamb would retain that property of reacting from this injection. I think possibly even in that small lamb, along at this season of the year, it may have been quite badly infested with grubs in the head. I recently made some observations along that line, and I was surprised how soon a little lamb would become infested with these grubs, which attain a very large size. I think there is a possibility and in the case where this reaction is shown that there may have been an actual infestation. You did not make a post-mortem of any of those lambs?

DR. HADWEN: No. I do not think there is any doubt, though, that the lamb was not infested, because it was far too early in the season for any flies to be about; if I remember correctly, we hadn't even seen any *Tabanidae* at that time and the *Tabanidae* come along before *Oestrus ovis*.

DR. CONNAWAY: Where was your material taken from?

DR. HADWEN: It was obtained from the heads of sheep which had been slaughtered.

DR. CONNAWAY: From older sheep?

DR. HADWEN: Yes.

DR. MCGILLIVRAY: I would like to ask Dr. Hadwen to say what the effect of crushing the grub was while on the animal's back.

DR. HADWEN: I can tell you something about that. I spoke about natural cases. The first case was of a pure bred cow which had been confined owing to bad weather for some time. She was let out. As a cow does after being confined, she ran about a great deal, and finally she went through a wire fence, and came back through the same opening, injuring her back. In a little while I

was called to see this cow, and I threw up my hands and said I had never seen such a case before. Her eyes were swollen; she was panting; the vulva and the anus were swollen; and she was purple where the skin was white. I said I didn't know what it was at all. I said there must be something wrong with her heart; she had been running too hard, she had strained it; that was all I could tell, and I was partly right. At that time I had not tried these experiments.

There was a second case which occurred on the farm I lived on, of exactly the same nature. The cow had been turned out, as in the preceding case, and had taken violent exercise; proving I think, without a doubt, that if an animal's back is injured and the larvae are ruptured, that shock will result.

Dr. Reichel: Do you find a large number of the older animals, non-sensitive to the first injection; or do you find any of them non-sensitive?

Dr. Hadwen: That is a question I cannot answer, because we have not done enough experiments. We killed three old cows, and we got reactions in eight others, and in three we did not get any. One was about two years old; that was the youngest.

Dr. Goss: Have you ever injected small doses in succession to determine whether the symptoms are long, and also how long salivation persists after the injection in those cows that have reacted?

Dr. I. E. Newsom: I would like to ask if heat has any effect upon the agents that he has used?

Dr. Day: I would like to ask a question in connection with the injury of the grub. In connection with this cow that ran and was injured, were the tissues around about the injury crushed, or was just the grub crushed? We find oftentimes in packing houses where there has been some pus formed around the grubs and the grubs seem to be dead. I am wondering now if there was a case of anaphylaxis possibly at the time they were injured, or providing the tissues had been torn about the grub, whether it would be absorbed if the tissue itself was not injured and was not allowed to percolate through the broken down tissues.

Dr. Connaway: Did you make any bacteriological studies of this nature? Might this not be due to some toxin development in the little sacs surrounding these grubs, say in the sheep or in the case of an ox? Isn't there a possibility that there may be a bacteriological reaction there?

Dr. Hadwen: Regarding the repeated small injections, I have not done that; but in the eye tests we found that we could repeat them very frequently and could do it every day if we liked with successful results. Of course, if the injections were large enough and injected into the body, then we would get a degree of

immunity. It depends very largely upon the rapidity with which these injections are made. In Richet's original experiments on anaphylaxis, he found if he took over ten minutes to inject a dose that shock would not occur, and that he could inject a dose which would otherwise be mortal; I mean that the dose was large enough to kill the animal several times over if it had been given quickly.

Heat I have not tried at all because I was afraid of heat. Of course, a lot of these things are destroyed by heat; so we did not use it in any of the experiments. I notice in the review that Ries gives, that they did use heat.

About the grubs being crushed and the larvae being found dead under the skin and the absorption; I have done a certain amount of work on this and observed it; but this is something that I don't quite understand myself. The absorption of the dead grubs is very slow apparently. I did one experiment this spring in breaking the larvae on a calf's back which only gave us the results that you see described in this paper; but we were too slow, much too slow, we took twenty minutes to break eight larvae, and presumably the absorption was not rapid enough to produce severe shock. Those grubs are lying under the skin and they will stay there, perhaps a year longer. I have found that the bodies of the grubs do not absorb very rapidly; I have taken them out myself months after they had died, and you will find the skin of the crushed body of the larvae. The larvae may be broken accidently as in transit, as the doctor suggests.

As for the pus in the warbles, I don't know of any work which has been done on it. Of course the pus organisms gain entrance from the outside, and it depends altogether, I presume on the character, the species, and the susceptibility of the animal to them. As to the effect of the introduction of the pus into the general circulation, this would depend on what bacteria and toxins it contained. In our experiments, though, all danger of that was, I think, fairly well removed, because we washed the larvae carefully in the purest running water which we obtained from a mountain stream, and that is, of course, all we could do; but we took very great care in doing this, and after they were washed, an extract was made, and then I examined smears for bacteria. The material used for injection was practically sterile; we only found an occasional germ, and the injections also did not cause any trouble in small animals, proving beyond a doubt, that bacteria played no part in these reactions at all. In the cattle during the whole course of the experiments we only produced one abscess.

NYMPHOMANIA OF MARES*

H. FULSTOW, Norwalk, Ohio.

I have been requested to make a report of nymphomania in mares, and to make a special effort to describe the kind of subjects that recover, and the kind that are not benefited by ovariectomy.

I do not know that I can enlighten you a great deal upon this subject further than what I reported in Toronto, in 1911. I have operated upon a great many more mares since that time, and the results in the main have been about the same.

Nymphomania or excessive sexual desire on the part of the mare, is of somewhat common occurrence, and when it does occur, is a very dangerous and disagreeable habit. Mares affected with this troublesome affliction are a source of great annoyance to their owners and, in fact, to anyone who has the care or management of them.

ETIOLOGY. A good many theories have been advanced as to the causative factor by different authors. Yet nothing very definite has been proven.

Nymphomania is often caused by diseased conditions of the generative organs, particularly inflammations, cystoid degeneration, hypertrophy of the ovaries, diseases of the uterus and vagina, occlusion of the os uteri, new growths, atrophy and hypertrophy of the womb are also mentioned.

This does not constitute an independent disease, but, is only a symptom arising from various causes. Tumors and cysts are quite common, affecting one or both ovaries, and, no doubt there are other conditions as well.

I remember some time ago, removing a cystic ovary from a three year old filly, that weighed 7¾ ounces, the other ovary weighed 1½ ounces. In a great many cases that I have operated upon I have found one or both ovaries diseased. In a few cases I have been unable to find any pathological changes whatever, either in the ovaries, or in any part of the generative organs.

Diseased ovaries do not always produce nymphomania. I have posted several mares, with diseased ovaries, that were kind and gentle in every way.

Neither does every mare that kicks have a pathological condition of the generative organs. Many cases have improved in

*Presented at the meeting of the A.V.M.A., Detroit, Mich., Aug. 21-25, 1916.

habit by being operated upon, that showed no pathological condition.

Heredity is an important factor which must not be altogether overlooked. Some animals are born with a bad disposition, inherited from the sire or dam, or perhaps both. I have known of certain families producing very vicious foals, both male and female. I spayed four fillies from one dam that were vicious and she herself was the same. They could do nothing with her but breed. Three of these were completely cured by ovariectomy. From the fourth, I afterwards removed the clitoris, and she also made a serviceable animal.

Might it not be possible in some instances for the stallion to assist in disseminating the disease, while suffering or convalescing from some contagious or infectious disease, such as influenza or strangles, or, after covering some dirty, filthy mare, through carrying the disease germs to a healthy vagina and from there be disseminated to the other parts of the generative organs?

In conclusion, I might say that, as far as the exact cause is known, and from my own personal observation, nymphomania is due to some irritation of the generative system, together with, in many instances, a mean or bad disposition.

SYMPTOMS.—These are easily recognized. The animals are irritable and ticklish, every touch seems to annoy them. They will kick, squeal, and strike upon the least provocation. They appear restless, neigh often, and show a great desire to urinate, straining a good bit in doing so, emitting only a small quantity of urine mixed with mucus and a dirty yellowish substance. If excited, they switch the tail at the same time and sometimes kick.

Others do not kick at all, but appear in heat most of the time, leaning up against you when you go into the stall to feed or harness them. In some subjects these symptoms are constant, while in others, they only appear during estrum. Neither age, breed, nor condition seem to have anything to do with it.

Some breed fairly well for a few years and others are practically worthless even for this purpose. In some of the milder forms of this disease they are fairly useful, but, as time goes on, they gradually grow worse, losing flesh from the irritation set up by the diseased condition and from the continual straining and, last but not least, from the abuse they receive at the hands of their owners.

Modus Operandi.—No doubt many of you are as familiar with the modus operandi as I am myself, but for the benefit of those who have never performed the operation, I will just outline it in a general way.

First.—Get as good a history of your patient as possible. Try to find out how long she has been mean and when she kicks—if only during estrum, or any time.

See that she is in good healthy condition, not suffering from any kind of fever, nor pregnant. If she has been kept up and grain fed, it is a good plan to give a laxative and a few bran mashes. If she has been running at pasture, she will need only starving for 24 to 36 hours. If the bowels are empty the operation is more easily performed with less danger to the animal.

An hour or so before operating, it is a good plan to give an ounce or two of chloral hydrate, according to the size of the mare, or you may give an intravenous injection of cannabis indica.

The subject should be secured in a good set of stocks, if no stocks are available, other means must be devised, such as slings, hippo-lasso, hobbles, etc., or in the recumbent position under general anesthesia.

After your animal is in the stocks with her head pulled up, with ropes or straps over the back and under the belly, to keep her from kicking and lying down, have your assistant carefully empty the rectum of all fecal matter and with warm water and soap wash off the tail and external parts. Then, wash with a 1–1000 bichloride of mercury solution, being especially careful to remove all sebum from around the clitoris and just inside the lips of the vulva. Do not wash out the vagina unless it is dirty, and then with only the mildest form of antiseptic. Strong antiseptics irritate the mucous membrane and cause straining, besides it would leave a good field for infection.

Place a bandage on her tail and tie it, or have your assistant hold it out of your way.

Having previously sterilized your instruments, and your hands and arms as far as possible, balloon the vagina by means of a fountain-syringe or clean piece of rubber-hose and funnel, with sterile water to which has been added a little soda bicarbonate.

With the knife concealed in the palm of the right hand, pass into the vagina and unsheath it. If the vagina is well ballooned, place the knife just a little above the os uteri and slightly to the

right or left and push it through the wall in a straight line, by a sudden forward movement, piercing all of the coats at one stroke. This is the most critical part of the operation.

Sheath the knife and drop it on the floor of the vagina. Then insert your finger to see if you have pierced the serous coat. If not, you will have to balloon the vagina again, because it will have collapsed and there will be danger of wounding one of the iliacs. It would be very humiliating to have her bleed to death before your eyes as one did for the writer. After it is again ballooned, pierce the serous coat with your knife, or, perhaps you might be able to pierce it with your finger without ballooning, but there is danger of tearing the serous from the muscular coat, leaving a pocket from which you might get an abscess.

When the incision has been completed, sheath the knife and drop it on the floor of the vagina, introduce one finger, then two, then with fingers in the shape of a cone, introduce the whole hand carefully rotating the hand while so doing. Immediately you are through the opening drop the palm of your hand upon the body of the uterus following it to its bifurcation thence each horn to the ovary. Examine each ovary as to size and condition.

Next, remove your hand, at the same time bringing out your knife, which you had previously dropped on the floor of the vagina. Rinse off hand and arm, and with fingers through your ecraseur chain pass it into the abdominal cavity, dropping it over the left ovary, pull the ovary into the loop of your ecraseur chain so as to get as much of the Fallopian tube and broad ligament as possible. The operator steadies the ecraseur with his left hand while his assistant tightens up the chain. The operator must make sure by feeling that no portion of the bowel is included in the ecraseur. Then, have your assistant work the ecraseur, crush off the ovary rather quickly. The animal will struggle some at this time. Hold the ovary until it is outside the body.

With the left hand remove the other ovary in the same manner.

Rinse off the external parts and remove from stocks. The wound made is left to nature. I have never known prolapse of the bowels to take place.

After-Care.—Tie up by the head so she cannot lie down for the first twenty-four hours, then turn loose in a good, clean box-stall or paddock if the weather is fine. Feed laxative feed, such as bran mash and grass (if in season). After a week or ten days,

if no complications arise, she may go home and be put to work, and kept at it for some time, to have a chance to forget her habits.

This report extends over a period of sixteen years and covers something over two hundred cases. In looking over my notes I find that at the Toronto meeting I divided them into three classes. First—Mares that are mean when in heat only, and those that are in heat continually, but do not kick. All will be cured by ovariectomy.

Second—Mares that kick nearly all of the time, whether in estrum or not. Some will be cured by ovariectomy, others will be benefited, and, in a few instances, the operation will do no good.

Third—Old mares that have kicked for years, and the habit has become confirmed, and those that kick all of the time when not in heat, but are gentle when in heat. These as a rule will not be at all benefited by the operation.

The results of the operation upon the first class are generally immediate.

In the second class, results may be immediate in a few instances in young animals, but, the majority go all the way from a few weeks to several months. One of this class, which I will report, went nearly two years.

As to the third class, I generally tell the owner that I think it useless to operate upon them.

Case Reports.—I will give you the history of a few cases of each class:

Class 1—Case 1.—Bay mare—8 years old—standard bred with quite a burst of speed. This mare was clever and all right in every way, both in the stable and in all kinds of harness when not in heat, but during that period, kicked, switched, and urinated, gradually getting worse.

This mare has been operated upon about two years, and the results were immediate. This man's wife and children drive her anywhere and feel perfectly safe. She had been acting badly for about three years.

Case 2.—Spotted mare—6 years old—in livery and used on a mail wagon. Clever in every way when not in heat, but, during estrum, could not be used at all and was growing worse. Had been kicking about a year, but, some months previous, only switched. This mare was operated upon six years ago. Results were immediate. I met a lady driving her about two weeks after she went home.

This same history will cover a great many cases of this class.

Class 2—Case 1.—Bay mare—10 years old—pacer. At first, she only kicked during regular periods of estrum, but, later, she would kick any time. Had been mean about two-and-a-half years and was getting worse. Was operated upon in 1914, was taken home and put to work. Improvement was noticeable and in two months was kind and gentle and at the present time is still all right.

Case 2.—Sorrel mare—three years old—draft breed. She had been mean from a suckling up to the time of operation. It was not safe to get anywhere near her, either in the barn or out. She would chase you if you came anywhere near her in the lot.

They tried to break her to harness but had to give it up. This mare was operated upon in the spring of 1915. The left ovary was cystic—weight 7¾ ounces, the right one 1½ ounces. This mare has been clever ever since the operation. She has been broken to harness and works well. Owner's statement says, "she can't be made to kick."

Case 3.—Bay mare rising five, 15.3 hands high, weight 1050 pounds, high bred (of the Wilks family) and showed considerable speed when broken to harness at three-year-old.

During the winter (then coming four years) she became an "out-law"—did about all the stunts on the calendar, could not be subdued, and was turned out to pasture in the spring, where she remained until after she was operated upon, the following August. She again ran out in the pasture until the first of October. Was taken up and an attempt was made to work her, but she still kicked and switched as badly as before. The following May, she was tried again but her disposition had made no improvement. Up to this time she had remained in fair flesh, but she began to lose flesh even though she was idle, becoming quite poor. She was dealt, late in October to a second party, who paid no attention to her, except that she was properly cared for; again running out in pasture, she took on flesh, becoming quite fat, and during the latter part of July was again taken up, when she appeared perfectly docile, took her work kindly and ever after displayed good manners, both in and out of the harness. About 18 months after the operation she became more docile, and at the end of two years was as pleasant as when she was three, which was fine. Since starting this paper, I have received word that she is still fat and tangible, kind and agreeable, showing her age but little and giving satisfaction to her owner.

CASE 4.—Brown mare, roadster, near 20 years old, at the time of operation. Had been bad only about 3–4 months previous to being operated upon. She quit her kicking and squealing in the barn, but is still a little troublesome when hitched on the street near strange horses, the owner says that he is well pleased with the operation.

CLASS 3—CASE 1.—Brown mare, cob 11–12 years old. She had been kicking and doing about all of the stunts that a horse can do for at least five years. She was a dangerous animal either in the harness or in the stable. One week after the operation, she was discharged and put to work. This mare displayed good manners, both in harness and in the stable immediately upon returning home. The owner's wife drove her to town a short time after, a distance of thirteen miles.

NOTE. Both ovaries were hypertrophied, showing conclusive evidence from the results obtained, and the condition of the ovaries, that the operation was the only means by which this animal could have been made useful.

DISCUSSION

DR. QUITMAN: I would like to ask Dr. Fulstow if he has ever performed the operation of clitoridectomy for the class of cases that has been described and how that operation compares with oophorectomy?

DR. FULSTOW: Yes, I have performed clitoridectomy a number of times before doing oophorectomy, and it did not do any good. In one of those cases that I did operate by oophorectomy, it did not cure the mare; she was improved some. Later I removed the clitoris, and she got all right after that.

DR. G. A. ROBERTS: There is no operation that we have been doing in the South that has met with as much public favor as oophorectomy. It is true that there are cases that will be improved and those that will not, and we have not had a sufficient number of them to be able to divide them as Dr. Fulstow has, into different classes. However, out of thirty-one that we have operated on in the last three years, there was only one of them that did not respond beautifully to it. One of the things that might be interesting to those of you who are not familiar with the southern condition—is that we use the mule very largely down south. Out of these thirty-one we have operated on four mare mules, with invariably splendid results. And in every case of nymphomania we have never failed in a single instance to find cystic conditions of the ovaries; we have made some attempts, from an experimental standpoint, to try to remove only the affected ovary, leaving the normal ovary present,

in some cases to see what the effect would be. In other cases, in horse mares, to see by the removal of the diseased ovary, whether that would effect a cure and the results were very satisfactory.

In the case of the four mules, the sound ovary was left. We were positive, as far as we could tell, that the one ovary was affected and the other normal, from manipulation of it. The one ovary that we removed was larger than my fist. Unfortunately we could not weigh it because in the attempt to remove it we had to rupture it to get it through the opening in the vaginal wall, but in less than four months afterwards, after the animal had completely gotten over the habit of kicking, squealing and biting, we received a report some time ago that there was a return of the same condition, within less than four months; that the animal was just as bad as she ever was. On a re-operation, we found to our surprise the second ovary, which at the time of the first operation was perfectly normal, was just about in the same condition that the first ovary was.

In every one of these mules, however, with the removal of both ovaries, perfect results were obtained from them; and, as I said, there was only one case in which the results were not successful. We did operate on one mare, as Dr. Fulstow mentioned in his classification, that was kicking all the time, it did not make any difference what the circumstances were. It belonged to a rural route carrier, and he gave her away because nobody could work her at all.

We had in our town an old gray mare that was driven to a laundry wagon, an animal that had been for years getting worse and worse, until finally they could not get a colored man to drive her at all. We had been asking the owner for a couple of years to allow us to operate on her. Finally he said: "kill or cure." We operated, and in a month's time afterwards of the thirteen animals that the laundry possessed, there was not a better driving animal, of a more gentle disposition and more easy to drive than this one. The mare was over twenty years of age at that time.

I brought the mule proposition in because mules correspond to virgins, and they have not apparently copulated. Yet we found in mare mules conditions similar to those found in horse mares that caused large cystic conditions of the ovaries. In many cases the condition was confined to one ovary, but in some cases to both ovaries; in some instances the cystic formation was not larger than the end of your thumb; in other cases the ovaries were as large as two fists and could not be readily removed without rupture of the cyst first. In every one of these cases from the mildest to the most extreme, they responded beautifully to the operation with the exception of the one case mentioned.

With reference to safety, we have been extremely fortunate, or lucky, because of the thirty-one, we did not have a single accident whatever happen. In some other attempts that have been made,

there have been some losses from hemorrhage and some septic conditions following, but we were extremely lucky in the number of animals we have operated on in having no unfavorable consequences. So far, there is no operation which has given us so much favor in the eyes of the public in overcoming these unsuitable conditions in animals that were absolutely worthless before the operation, which rendered them perfectly tractable and as good as any other animal after the operation.

Dr. Ellis: The doctor has referred to a case of mine that I reported. I wish to say just a word because we might find some other cause for a return in my case. The conditions were identical, in one sense, that one ovary was very largely cystic, and the other was normal; but both ovaries were removed at the same time, and yet we had a return. It may have been a psychical condition and it may have been that the handlers of this mare were so determined that she would not be cured of that habit, or that vice, by the operation, that they used every test they could to try to see whether she would not kick again, and she accommodated then. A mare mule that I reported about fifteen or sixteen years ago, was giving milk. I called it lactation of a virgin in mules. That was one of the most remarkable cases of nymphomania I ever saw in a female animal.

Dr. Roberts: Did you operate on that case of lactation in the mule?

Dr. Ellis: No, not on the mule.

Dr. Roberts: We had one some months ago that had periods in which she would give from a pint to a quart of milk. We tried our best to get the man to allow an operation, but we were not successful.

Dr. Blattenberg: I would like to ask the gentleman who operated on the mare what method of restraint was required.

Dr. Roberts: We had a fellow at the twitch, one at the halter and one at the tail. Unfortunately, we have not had an opportunity to get the subject confined. We put a side line on over nine-tenths of the cases. We have simply had the side line on out in a lot. We try to keep them moving so they won't get down. We have attempted to use some local anesthesia. Some of them have stood perfectly still, and others we have had to raise up off the ground in order to keep them still.

Dr. LaCroix: I was very much interested in Dr. Fulstow's paper, particularly in the restraint that Dr. Blattenberg has just spoken of. I believe the average practitioner who is not doing this operation, is a little timid in undertaking it. The matter of restraint is an important one. If, however, you administer from an ounce and a half to two ounces of chloral hydrate into the rectum after having an assistant empty the contents of the rectum, the restraint is not difficult. I have handled range animals, young ones a year and a half old, in an improvised chute. I have handled them down on the ground and almost every other way. About the bal-

looning of the vaginal wall, I think the unskilled operator may have some difficulty if he depends upon that to carry out the operation successfully and conveniently. The novice, or rather the man who is a little timid about doing this operation, would be a little slow in his technique, and by the time he gets ready to make the incision in the vaginal wall, the ballooning will have subsided. I use, in some cases, a blunt pointed embryotomic hook. I do not bother about injecting fluids or ballooning. By tensing the walls of the vagina, one can make the incision very safely. In other words, I think it is well in each instance to locate by palpation the arteries. Locate the aorta and the iliac branches, and in this manner one can readily avoid puncturing. With regard to results, I have not had occasion to classify them as the doctor did, but it is a well known fact that in conditions that have been chronic, the results, if attained at all, do not come very fast, even several months being not uncommon.

Dr. Roberts: I would like to ask Dr. LaCroix if he did not get a good deal of hemorrhage when he used chloral hydrate: We have used it a number of times ourselves for that express purpose, but invariably we got so much hemorrhage that we tried to use some other method of anaesthesia and control, and at the same time be humane. We tried so far as we could do so to avoid that hemorrhage.

Dr. LaCroix: I would say briefly that I have had no trouble with hemorrhage. It may have occurred but I have not noticed it and have had no losses due to hemorrhage.

Dr. Merillat: I think you old surgeons who have done this operation so much take for granted that everyone can do this operation with great ease; while, in fact, there are many ugly stumbling blocks in mare castration that the new operator meets. You are giving an entirely wrong idea of this operation by saying that, Zip! anybody can go in the vagina and get the ovary. To do it is not very easy. I find that new operators often fail to find the ovaries very easily. It is not just such an easy matter to put the hand through the abdominal cavity and find the ovary. Sometimes the new operator fumbles quite a long while before the ovary falls into his hand. Can you guess the reason why? So often the great mesentery lies between the hand and the ovary, and he hunts and hunts and hunts, and he is pushing the ovary away from him all the time. There is a curtain between him and the ovary. I have met that so often myself, and I had to do some awful things in there before I learned what was the reason. A pretty experienced surgeon confessed to me, after he had performed such an operation, that he found a good sized hole in the mesentery when he opened the abdomen on a post mortem. In this case he had grabbed the mesentery, and went over the mesentery and made a nice opening through it. That is one of the stumbling blocks in intra abdominal surgery with the hand, that you operators meet, not only in the

castration of mares, but in all kinds of intra abdominal work, which you must always have in mind. I think if the operator has this in mind at the moment he enters the abdomen, he at once manipulates his hand in such a way as to overcome it. That is, if you are hunting for the left ovary with the right hand, you would dip the hand down and get under the bowel, and you would come up into another space where the ovary would fall right into the fingers. That is one of the stumbling blocks of this operation. I have noticed in veterinary association meetings those who have done the operation quite often do it rather poorly in many cases.

Another thing that was not touched on was the possibility of making brood mares out of some of these awful kickers, and since Dr. Roberts has spoken of operations that were successful, that opens up a means of conserving such animals for breeding purposes by removing only the affected ovary. In the future, in my operations, I shall only remove the affected ovary. I believe that it is sufficient, and will conserve a breeding animal, and undoubtedly does just as much good in restoring her usefulness as if both had been removed.

Dr. Ferguson: The class of mares that I have operated on has been mostly extremely vicious mares, and my technique for operating has been to confine them in stocks, and I consider that none too good a confinement. They were all mares that would fight considerably; and, in addition to confining them in the stocks, with a sling under them, and ropes over them, and hobbling them to the floor, I always anaesthetize with chloral hydrate, from an ounce to two ounces, according to the size of the mare. The result of my experience has been along the line of Dr. Fulstow's. A considerable time elapsed in most of my cases before any improvement was noticed. One mare, in particular, was a mare that at one time had a very sore neck, and after operating on her, I cautioned the owner to be very kind to this mare for some time, and he was kind to her, treated her nicely, and she was improving apparently, making a nice recovery from her mean disposition. He sent his man after some baled hay, with this mare and another horse, one day, and they got in a position where they had to do considerable backing, and they had no breeching on the harness, and it started this mare up again, the irritation of backing, the pressure on the neck started her to kicking again, and it was over two years before they could get the mare back so that she was as good as she was six months after the operation; but eventually she made a nice recovery.

The incision, in my experience, is the hardest part of the operation. I have had the accident that Dr. Merillat referred to; in one case that I operated on I found the ovaries without trouble. I prepared this mare by fastening her for thirty-six hours, and during that time my stable man reported that she pawed considerably. I operated on her, and about half an hour after the operation we

found this mare with her feet up in the manger. We removed her from that position. In due time she was fed a little meal. After eating, she seemed to be inconvenienced, and we gave her a little treatment, and she eased up in time; but after the next meal she developed the same symptom, and continued along that line for the neighborhood of a week, or eight days. In the meantime we had to relieve her rectum, and eventually she had a bad turn and we took her in the country a mile and killed her and made a careful post mortem examination. I found that in removing one ovary I had taken the omentum, ovary and all, which caused a protrusion in the bowel and strangulation, and that would have caused her death. I thought, at first, that possibly that mare was afflicted before the operation, that she had had that accident, but talking with Dr. Merillat and comparing notes, I think there is no question but that the trouble was in removing the mesentery at the time of removing the ovary.

Dr. Fulstow: I would like to ask Dr. Roberts how he can tell the difference between a true cyst and a Graafian follicle, when it is only the size of the end of his finger nail, before he takes it out of the mare, in case he wants to leave one ovary in there for breeding purposes?

Dr. Merillat: You can do that very easily. Your question is how to differentiate between the Graafian follicle and a cyst?

Dr. Fulstow: Before you take it out of the mare, how can you tell the difference between a true cyst and a Graafian follicle?

Dr. Roberts: I do not know that we are enabled to. Unfortunately, we have not made the different forms of examination in the two classes of animals. In our mares we have never made,—and I regret to confess it—a rectal examination, and we should have done so. We have always found the circumstances as wanting something to be done, and we have always gone ahead and done it. On the other hand, in cows, we have not made the vaginal examination, but we have made the rectal examination, and in the cows there might be some difficulty in the first inference as to whether it was a Graafian follicle or cyst. Invariably with the cow we have always made a re-examination some time afterwards so that if it was a Graafian follicle, it would have had time to have ruptured. In a purely surface examination, I do not believe it is possible to make a distinction between the two. On the other hand, the Graafian follicle is so sloping and so different from the bulginess of the cyst, that we have considered any way we were capable of differentiating between them.

Dr. Merillat: If Dr. Williams were here, he would tell you just how to do that. Dr. Williams differentiates abscess, cyst, yellow body, through the rectal wall in the palpation of the ovaries of the cow, and I know that he does it because Dr. Cotton, just a few days ago in Minnesota, checked him up in some of his diagnoses on a post mortem, and he found that Dr. Williams was right.

So this indicates to me that we have not developed our full possibilities in palpations of the ovaries. But what Dr. Fulstow meant was, even when your hand was on the ovary in the abdominal cavity, during your operation how can you differentiate?

Dr. Fulstow: Yes, so that in case you want to leave this mare for a brood mare, you could leave the other ovary in.

Dr. Roberts: We have always satisfied ourselves with the manipulation while we were in there. If we found one ovary was much altered, and the other nearly normal, we went on that basis. We believe it can be done just as readily beforehand by rectal examination.

Dr. Merillat: What I had in mind in referring to the unilateral operation was just what Dr. Roberts says. We found one ovary enormously large, unquestionably diseased on account of its size, as big as a baseball or cocoanut, and I should remove that only.

Dr. LaCroix: I understand you, Dr. Merillat, to refer to differentiation in the cow only, did you not?

Dr. Merillat: I did, as far as Dr. Williams' manipulation was concerned.

Dr. LaCroix: You will recall there is a difference in the density and in the thickness of the covering of the ovaries in the cow and in the mare. In my own experience, I have not been able to distinguish,—at least I am not satisfied with my diagnosis, in the mare; I have not been able to readily distinguish a Graafian follicle from a cyst. The heavy dense tunica albuginea does not allow much bulging, in the cases where I have tried to distinguish, so that I cannot positively say that it is easy to distinguish between the two conditions in the mare, in my experience. It is easy enough in the cow, but not so easy in the mare.

Dr. Murphey: In regard to the cow, I should like to offer just a little comment. We have been making a study of this problem, to tell whether they were cysts or Graafian follicles, by dissecting sections of a number. I have graduate students working on that problem now. I am inclined to believe there is no distinction between cysts and Graafian follicles in the early stages of the cyst, at least. In the follicles that are undergoing degeneration, that have largely developed so-called atresia of the follicle, there is no superficial distinction between them and the follicle. There is some work that has been done recently in Louisiana. I am not sure of the animals. There was no such distinction found. In that particular work there were some physiological experiments performed to determine the character. In those that showed any atresia, or cystic condition, they have found that the fluid in the atresia follicles and well-developed cysts, contained an enzyme or ferment, I do not know just which term to use, but at least it had the power of digesting protein, and that is possibly the explanation of the formation of the cysts. As to the surface, we have been unable to find any distinction. The problem was suggested, I be-

lieve, by Dr. Bemis, to find whether there was any surface difference between the Graafian follicle, or atresia follicles and large cysts. So far our studies have shown there was no point of distinction. I question some of the statements that others make in regard to their ability to diagnose by surface differences.

Dr. Roberts: We would like to say also that we have done a great deal of work histologically, and that we have found a cyst of two different forms. We have found one cyst that is not any more than a large Graafian follicle, and again we have found a large portion of our cysts as a result of degeneration of persistent corpus luteum, in which we have a large number of sections, showing different degrees of degeneration of the corpus luteum.

Dr. Campbell: I understood Dr. Fulstow to classify these cases into two divisions: the large one, where there was disease of the ovaries or other degenerative organs; and the smaller classes, containing an appreciable portion of the cases where he said it was due to heredity. I understood him to say that he found the ovaries normal there.

Dr. Fulstow: That is right. I have noticed a good many mares I treated, and I found no diseased condition whatever in the ovary.

Dr. Campbell: That being the case, I do not see where there is the safety in your idea of leaving one ovary and removing the other, because you think it is good. I understood Dr. Roberts to say that every one of his thirty-one cases were cases where there were diseased ovaries. Dr. LaCroix did not mention whether all of his were diseased or not. It seems the discussion has been about one class of cases, and the paper was read about a broader division of it, and the essayist being right, and we know that he is, it is not going to be safe to leave one ovary in there, even if it does seem to be normal, if the mare is a bad one; it is necessary to take them both out.

Dr. Fulstow: I think a good many times that mares will kick, mares with mean dispositions, where we haven't any degeneration of the ovary, mares will kick just from irritation; and by removing the ovaries you correct that irritation.

Dr. Merillat: We do not understand that, Doctor.

Dr. Fulstow: I said I had treated, or operated upon a good many mares that kicked, where I did not find a thing wrong with the ovaries, nothing wrong with them whatever, but the irritation set up at the time of estrum is what produced the kicking. Their disposition was mean, and just that little irritation made them kick.

A Member: They were improved by the operation, were they?

Dr. Fulstow: They were improved by the operation, yes.

Dr. Merillat: In a confirmed kicker, how long after the operation was there any manifest improvement?

Dr. Fulstow: The mare that I reported in class 3 had been kicking for five years. I think she was kept about ten days and re-

turned home and immediately put to work, and was kind and gentle in every way ever since the operation. This mare has been operated on about a year, and she could not be used either in harness or out of harness previously; they could not go into the stable or anywhere near her, and she was improved right away after being operated on. Then some of the other class have gone for six months, two months, and one went two years.

DR. MERILLAT: That is a good point to bring out about the spaying of mares. Practitioners often draw the wrong idea of spaying mares by expecting immediate improvement. Some of our cases have been improved after ten or eleven months, and a splendid improvement too. Others have improved after three months. I have in mind now a case of a fine chestnut draft mare that became vicious rather suddenly, and was perfectly useless; a splendid mare, worth easily $300, that was spayed and sold a month after the operation because the operation was not a success, sold for a small price. I had occasion to see that mare three months afterwards, and found her driving around on a single wagon, perfectly tractable. That is an important point in the prognosis of the disease.

DR. ROBERTS: In every case of the thirty-one we have had, there were diseased ovaries, but we have not operated where we did not think there was real need for it. On the other hand, I hope that we will consider this proposition as essential, from the remarks of the Governor here last night with reference to humanity.

With reference to the last case referred to, there was a great long iron pipe laid alongside of the barn where we went to operate. The owner said, "you see that bent iron pipe? That is what I have been using on this mule mare to get her to do the service I want of her." It was simply that there was such an irritation that the animal was not accountable for its actions whatever. It was simply a case of humaneness to operate on such a case. I believe there are many animals today that are being brutally treated under the same circumstances. This fellow said he bought her from another man, saying, "I will make her work or break her damn neck, one or the other." That is just the way a large number of them do. We have in every case, excepting one, found a splendid improvement.

—Flight-Lieutenant Rochfort Grange, son of Principal Grange of the Ontario Veterinary College, was recently wounded in the shoulder by a bullet. For his services at the front he has been awarded the Distinguished Service Cross.

REMOVING RETAINED PLACENTAE BY INJECTING PLACENTAL VESSELS WITH SALINE SOLUTION*

DR. R. R. SHAW, Sidney, Ohio.

The problem of removing the placenta other than by the manual method has been given much consideration by prominent veterinarians and associations for several years. The method of manual removal has been in vogue since veterinary science has existed and up to the present time it has not received much elaboration. The method as practiced has numerous objectionable features which are dangerous to both operator and patient. Among these are infection, traumatic injury to the uterus and severe metritis. The usual method is also objectionable on account of insufficient arm-length.

The new method we are here offering the profession theorized and developed by Dr. D. L. Englerth and myself is as follows:—the technique of our method is very simple and the outfit can be purchased at very little cost. Before describing the operation I shall give a list of the articles that make up the apparatus:

1—quarter inch canula 10 inches long
1—rubber tube 10 feet long
1—pump and pail
2—gallons of normal salt solution.

It is important that the umbilical cord is intact and accessible to the operator. A large radicle of the vein may be used if part of the placenta has been removed.

The canula is introduced into either the vein or the artery of the cord through a longitudinal incision and is held in place by a ligature. The tube is then attached to the canula and after attaching the other end to the pump the operation begins. The saline or antiseptic solution is slowly pumped into the placental tissue, which upon being engorged with the liquid behaves similar to erectile tissue. As the placenta distends the liquid by hydrostatic pressure detaches it from the uterine surface. The choroid venules become distended and rupture, permitting the solution to pass to the uterine surface of the placenta. The villous processes are detached and there is a uniform separation of the entire membrane.

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*Read before the Northwestern Ohio Veterinary Medical Association, Toledo, Ohio., February 21st, 1917.

Uterine contractions are stimulated and thus aid in loosening the attachment. After the membranes are completely detached a moderate traction will deliver them.

CLINICAL REPORT:—October 9, 1916, I was called to see a cow that had been in labor six hours. The delivery was affected by traction which left the patient in a very weakened condition. I instilled a gallon of saline solution into each vein and had a complete delivery of the placenta in five minutes.

REPORT No. 2:—November 7, 1916, I was called to see a cow that had passed part of the placenta leaving the remainder attached and protruding. One-half gallon of saline solution was instilled into the placental tissue through one of the large radicles of the umbilical vein, which immediately detached the placenta.

REPORT No. 3:—My third case was a firmly attached placenta in a cow which I found immediately after delivery. A gallon of antiseptic solution instilled through the umbilical vein detached it in two hours.

Peroxide of hydrogen or permanganate of potash solution may be used instead of the saline solution. The operation is less effectual where the placenta has been meddled with in futile attempts to detach it. In such cases it may be difficult to find the cord. It is likewise less effectual after the membrane has been weakened by decomposition, which leaves the walls of the vessels too weak to support the solution. The operation is one that should be practiced as soon after delivery as possible.

DISCUSSION

DR. MERILLAT: The subject of retained placenta to-day I think is attracting more attention in the veterinary profession than any other subject because of its relation to abortion disease, which is recognized now as the great American scourge. That this disease is threatening our live stock industry is pretty well understood. I believe that our best investigators on abortion disease maintain that the retained placenta is one of its manifestations. When the placenta does not deliver in the proper time the delay is oft times said to be the work of the bacillus of Bang. An animal thus affected is a dangerous subject because it may contaminate others.

As regards the prevailing modus operandi; it is becoming customary in the veterinary profession to remove the placenta manually only when it can be detached with ease. Forcible detachment is not practiced at all in the good establishments where valuable animals are involved. Our best veterinarians to-day rec-

ognize the fact that the tearing away of the retained placenta is unwise, but the veterinarian working in his own field is handicapped in that his customer when calling upon him to deliver a subject of an attached placenta is expected to remove it and if he does not do so he would be criticised. He therefore proceeds to do the wrong thing, tearing it away against his better judgment. Nowa-days many recommend it be left alone and treated with preservatives until it can be more easily detached some few days hence.

Now comes this remarkable system which to me is such a surprise that I shall suspend judgment on its merit until I hear more about it. If Dr. Shaw's method is as effective as his paper seems to indicate we have heard something that will revolutionize the old plan of handling after-births. Naturally he has made history. This system will enable us to leave the placenta alone until it is ready to remove. If this method does not always detach it I can see that the method will do less harm to the subject than the manual one. I am certainly pleased that Dr. Shaw has brought this subject before you and am especially pleased to note that he has tried it out well before giving it publicity.

I cannot claim to have any broad experience in obstetrics as most of the knowledge about such matters I have gathered through these kinds of discussions in association meetings. I therefore approach this subject very cautiously and am not expecting you to take my remarks too seriously.

Dr. Mayo: I want to thank Dr. Shaw for presenting something new, because I try to keep pretty well posted with veterinary progress in recent literature, and this phase of the work has never been touched upon before. I also want to take issue with Dr. Merillat and his part of the statement as based on Dr. Williams' work, that all cases of retained placenta are indicative of abortion. I do not believe it, and I want to emphasize my statement now. We had retained placenta 40 years ago and I know we never had any deaths from this disease. I have seen it on the range. I will admit that it is much more frequent with contagious abortion. You know when a man gets to working with some special subject and gets all wrought up with it, everything that comes along he naturally or unconsciously points to his theory to show that he is right in his analysis.

Dr. Merillat: I think that Dr. Mayo has misunderstood me. I will try to make a corrected report about this. I said that retained placenta is generally caused by abortion disease and I still maintain so. Those cases on the range 40 years ago might have been due to some other cause, and then again they might have been caused by abortion. There are not many causes of metritis in our animals except abortion disease. It is better to suspect the retained placenta as a pest than to pass it off as a triviality on any occasion, and I am not so sure that these animals that Dr. Mayo saw 40 years ago did not have contagious abortion. We know conta-

gious abortion to-day because we study it. We know that contagious abortion does not always manifest itself by abortion. Abortion phenomena represent a different condition than abortion disease. We look upon abortion disease to-day as a general venereal disease, manifesting itself by premature expulsion of the fetus and other symptoms, such as retained afterbirth and sterility. I am not insisting that all cases of retained placenta are caused by contagious abortion, but that they are all caused by metritis, and that metritis is usually due to abortion disease.

Dr. Houser: Dr. Shaw first called my attention to this method of removing retained placenta last October. At first I injected about 3 gallons of saline solution, then proceeded with the old-time manner of removing it. I found the injection was a great help. In all cases where I have tried it I find that the placenta was expelled in from 2 to 6 hours after the injection. I have had from 15 to 20 cases.

Dr. Neal McNeal: Dr. Shaw told me about this system about a month ago and I have tried it on 7 cases with very satisfactory results. I simply injected about 2 to 3 gallons, but I believe that it was a little too much, less would do. In our cases the placenta came away in from 8 to 12 hours after the injection. We never had to drag it away.

Dr. Adams: Tell us the difficulty of your experience in trying the injection.

Dr. Neal McNeal: The vessels are sometimes very hard to bring out far enough to insert the tube. I endeavor to bring them back with a pair of long dressing forceps, with which I bring the vein out where I can insert the tube.

Dr. Merillat: Do you believe that the uterus at this time would be light enough to be retracted with forceps?

Dr. McNeal: Yes.

Dr. Merillat: Have you ever used Albrechtson's forceps to facilitate matters?

Dr. McNeal: I have never tried them.

Dr. Merillat: It has just occurred to me that frequently the vessels would be so far back it would be difficult to find them.

Dr. McNeal: Yes, I do find them in that condition quite often. I, however, have not had much difficulty since I commenced to use dressing forceps.

Dr. Houser: Generally I work the pump myself and as soon as I commence to get a good heavy pressure I quit. Previously I used to inject 2 to 3 gallons but now I find that a gallon is plenty.

THE ETIOLOGY OF HOG CHOLERA (PRELIMINARY REPORT)

Frederick Proescher, M.D., and Harvey A. Seil, Ph.D.
Pittsburgh, Pa.

The investigations of de Schweinitz and Dorset[1] 1903, and Dorset, Bolton and McBryde[2] 1905, have shown that the causative agent of hog cholera is a filterable virus. The findings of these authors were corroborated by Poels[3] in Holland, Ostertag and Stadie[4], Wasserman[5] and Uhlenhuth[6] in Germany, Hutyra[7] in Hungary, the Board's Laboratory in England[8], Theiler[9] in South Africa, and by others. The virus is filterable through Berkefeld, Heim, Pukall and Chamberland filters. According to Von Betegh[10] it is retained by the ultra filter of Bechold. Uhlenhuth states that a part of the virus is retained by all filters, since the filtered virus is not as potent as the unfiltered. In spite of numerous painstaking investigations, the virus of hog cholera has neither been rendered microscopically visible nor has it been artificially cultivated.

Since other filterable viruses as poliomyelitis[11], rabies[12] and variola[12] can be stained and thus become visible under the microscope, and since these can be artificially cultivated with the original potency retained to such a degree that the respective disease can be reproduced in animals by distant subcultures, the same method of procedure which leads to the discovery of the above mentioned microorganisms was applied to hog cholera. One of us (Proescher)[12] has shown that filterable viruses possess characteristic staining properties, i. e., they can be stained only with certain aniline dyes belonging to the thiazine family such as methylene azure, toluidine azure and methylene violet, either as free base or as the readily dissociated carbonate. The inorganic acid salts are not suitable. Furthermore, the filterable viruses consist of lipoprotein explaining satisfactorily their filterability by virtue of a greater flexibility due to the lipoid component. This latter renders the virus a solvent for the free dye base whether present as such or set free by dissociation.

Since the virus of hog cholera circulates mainly in the blood stream, the greater part of this investigation was restricted to the blood. Blood smears were made from the blood of six pigs in the advanced stages of hog cholera, and also from the blood of twenty-

eight pigs artificially infected with virus. These last pigs were killed on the eighth day of the disease, and samples of blood were then taken. All the pigs were examined post mortem, and the characteristic lesions of hog cholera established.

The air-dried blood smears were fixed for half an hour, either in methyl alcohol or in a 5% aqueous solution of sodium tetravanadate and the fresh smears of a 5% alcoholic ammonium uranicitrate solution at 60 degrees C. for the same time. The smears from the last two fixations were thoroughly washed with distilled water and stained in a 1% aqueous solution of methylene azure containing 1% of phenol. The smears fixed in methyl alcohol were dried and stained as above. The cover slips were floated on the methylene azure solution to prevent precipitation for about eighteen hours, then thoroughly washed with water, dried and mounted in paraffin or cedar oils.

The smears fixed in methyl alcohol showed the following: the red cells were stained a bluish-green; the nuclei of the leucocytes either blue or a metachromatic violet; the protoplasm of the polynuclear leucocytes either colorless or a faint blue. The granulation of the neutrophiles and eosinophiles were not differentiated, while the granulation of the basophiles were stained metachromatically. The protoplasm varied from a slight to a deep blue. The blood platelets were stained a very faint blue. Besides these common elements, oval or irregularly outlined cellular elements which showed a deep blue oval nucleus surrounded by a greenish protoplasm, were seen. These cells varied in size from 20 to 40 micra. They either occur isolated or in conglomerate masses. On close study and by the use of other fixing agents which preserve the cellular structure better than methyl alcohol, these cells are unquestionably exfoliated endothelium cells from the walls of the vessels.

The protoplasm of some of these endothelium cells include two well defined structures. The first occurs either as deep blue thin filaments about 6 to 7 micra in length, or as rods simulating bacilli about 2 to 3 micra in length, arranged in parallel chains which are usually found in the distal protoplasm or generally distributed over the cell, sometimes even in the nuclear membrane. Besides these, deep blue cocci-like formations, or isolated cocci, are noted. All these structures are undoubtedly mitochondria, a normal constituent of the protoplasm which is at times mistaken for either a microorganism or one of the developmental stages of microorgan-

isms. Our recent investigations, to be published in the near future, show that these polymorphous structures found in the protoplasm are normal cell constituents which are identical with the mitochondria first described by Benda[13], who made it visible by a complicated staining method in the sex cells. We may mention briefly that our staining method demonstrates mitochondria in the epithelial cells of the integument, as well as in the interstitial cells of the testes, and renders it visible in certain pathological conditions of the nerve cells.

The second structure found in some of the endothelium cells is a very small diplococcus, uniformly less than .2 micron in size just on the limit of microscopic visibility. These diplococci are stained either a deep blue or a metachromatic violet. Their form is either spheroid or ovaloid. Some of the endothelium cells are entirely filled with these cocci which are readily differentiated from the polymorphius mitochondria by their uniform morphology and size. They are also found extracellular between the red cells or attached to them as diplococci and occasionally as short chains consisting of four to six cocci or sometimes grouped in clusters. Now and then the cocci are found in the protoplasm of the polynuclear leucocytes. At times the cocci are also seen embedded between peculiar deeply-stained, agglomerated roundish lymphocytic-like cells. The size of these latter is about 7 to 8 micra, exhibiting a large nucleus and a very small barely visible cytoplasm. These cell masses undoubtedly originate from the walls of the vessel and the histogenic lymphocytes. The micrococci are occasionally seen within the nuclei. Some of the cells undergo partial metamorphosis showing pyknosis and karryorhexis of their nuclei.

The cytoplasm of the endothelium cells as well as of the large lymphocytes shows peculiar cell inclusions in the form of either dark blue or blue roundish formations similar to the Guarnieri bodies, characteristic cell inclusions of variola. Their size varies between 2 to 4 micra in diameter. They are either stained a uniform blue or show a granular structure. They are distributed throughout the protoplasm or may be attached to the nucleus.

These cell inclusions were uniformly found in advanced stages of the disease.*

Smears fixed by ammonium uranicitrate preserves the endothelium cell in a most remarkable manner. The mitochondria and the microorganisms exhibit a well defined differentiation while the red cells and the majority of the white cells merely appear as outlines and sometimes are hardly visible. The extracellular organisms are generally found in groups, due probably to the fixation. The differences between the mitochondria and the microorganisms are well pronounced. The inclusions in the endothelium cells are also clearly stained.

The microorganisms found in the blood were also found in the urines of three pigs artificially infected with hog cholera. The fresh urine was centrifuged and smears made from the sediment. These were fixed and stained as in the case of the blood. Microorganisms occurred in large numbers sometimes as isolated cocci, and quite frequently in rather dense agglomerations. These findings satisfactorily explain the highly infectious nature of the urine.

The microorganisms just described were found in the blood of all the pigs examined. The method of staining, the localization of the cocci in the endothelium cells, their uniform morphology, their minute size which explains their filterability, the formation of cellular inclusions, all properties of the known filterable viruses, indicate that these microorganisms are the causative agents of hog cholera. Of course, the absolute proof is the cultivation of the microorganisms and the production of the disease by distant subcultures. This artificial cultivation is at present under investigation, and we hope to report upon this phase in the near future.

The changes in the blood picture in hog cholera closely resemble those of typhus fever (typhus exanthematicus) in humans. A great number of endothelium cells is found in the blood stream

*These cell inclusions are altered mitochondria. Our unpublished study of the Guarnieri bodies in variola vaccine indicate that these inclusions are disintegration products of mitochondria. While the microorganisms multiply in the cell a part of the mitochondria undergoes a chemical change, probably a splitting off of the lipoid component, thus giving the remainder of the molecule a chromatophilic affinity for the common strains. This is confirmed by the fact that unchanged mitochondria occurs within the inclusions. This change may be due to the diffusion into the cell of the toxin generated by the virus. The mitichondria, too, appears to play an important role in cell protection probably causing the formation of antibodies. It is a significant fact that the amount of the mitochondria is increased during the infection.

in both. One of us (Proescher)[14] has shown that the causative agent of typhus fever is primarily found in the endothelium cells and also free in the blood stream. The morphology of the micro-organisms closely resembles that of those in hog cholera and a diplococcus is also present although somewhat larger in size. The pathological changes in hog cholera are analogous to those found in typhus. In the peracute and acute cases of hog cholera, the disease is a septicemia with a high continua. The pathological changes found in uncomplicated cases are hemorrhages in the skin and internal organs. In hog cholera, as well as in typhus, a bronchial pneumonia may be found. The only difference is in the intestinal canal. In hog cholera, necrosis is occasionally evident, which is not the case in typhus fever in humans. Another similarity is the necrosis of the distant organs, such as of the ear and snout in hog cholera, and of the extremities in typhus. This similarity points to the probability that the primary seat of the disease in hog cholera is found in the arterial capillaries. This was demonstrated histologically by Dr. E. Fraenkel[15] in typhus, showing a so-called periarteritis (periarteritis nodosa) of the small vessels of the skin with a proliferation of the endothelium cells of the vessels and a consecutive thrombosis. A careful histological examination in hog cholera has not yet been made but the above analogy to typhus in the pathological changes in hog cholera indicates a probable similarity of disease causation. A histological study of the changes taking place in the vessels caused by hog cholera is in progress and will be reported in a future paper.

We wish to express our indebtedness for the valuable assistance given us by Dr. John Lichty, and Dr. D. W. McAhren of the Purity Serum Company, while engaged in this investigation in Sioux City, Iowa.

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PLATE I.

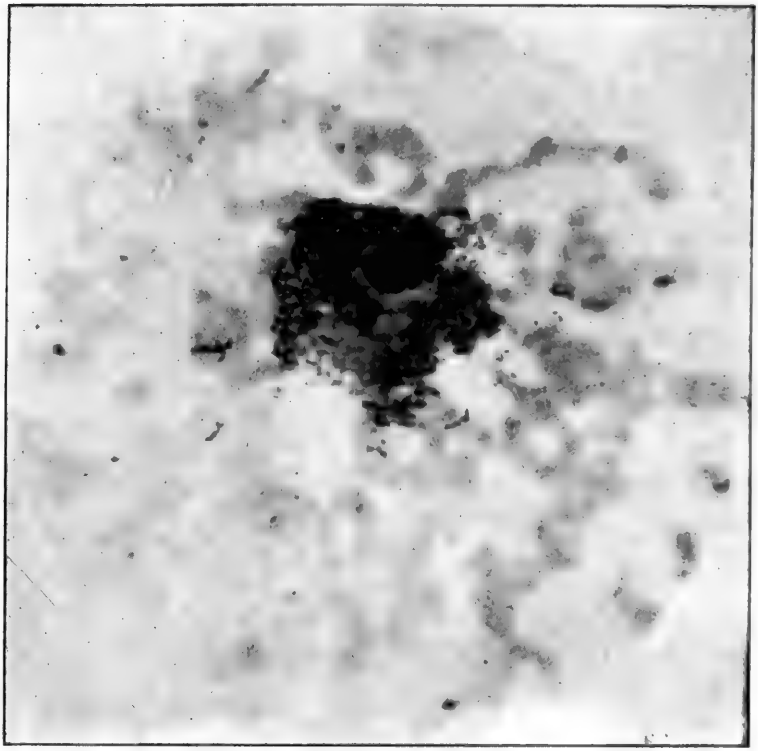

Figure. 1. Smear—Hog Cholera Blood—Endothelium Cell—showing diplococci also extracellular virus—Leitz 1/12 oil immersion—Ocular 2.

Figure 2. Smear—Hog Cholera Blood—Endothelium Cell showing diplococci, mitochondria and inclusions.
Leitz 1/12 oil immersion—Ocular 2.

PLATE II.

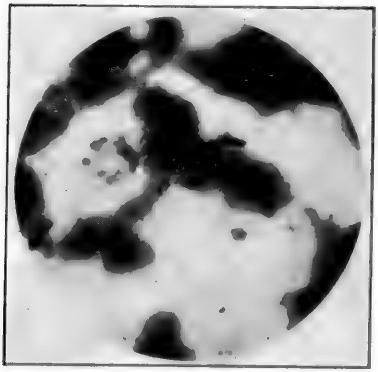

Figure 3. Smear—Hog Cholera Blood—showing microorganisms attached to red cells.
Leitz 1/12 oil immersion—Ocular 2.

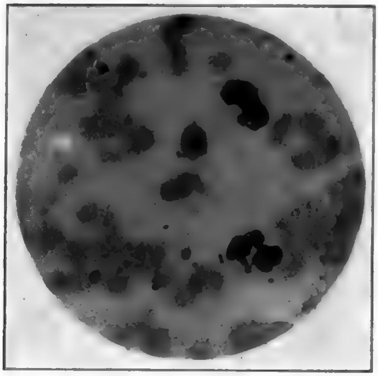

Figure 4. Smear—Hog Cholera Blood—showing microorganisms both in the protoplasm of a polynuclear leucocyte and also extracellular.
Leitz 1/12 oil immersion—Ocular 2.

Figure 5. Same as figure 4 but 4000 magnification.

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—At the twelfth annual meeting of the Ohio Valley Veterinary Association the following officers were elected: President, G. P. Isbel, Hopkinsville, Ky.; First Vice-President, C. F. McKinney, Vermilion, Ill.; Second Vice-President, John J. Fasser, Salem, Ill.; Third Vice-President, C. D. Bailey, St. Elmo, Ill.; Secretary, C. S. Henry, Terre Haute, Ind.; Treasurer, B. F. Stahl, Oblong, Ill. More than two hundred veterinarians were present and a very successful meeting was reported.

—Dr. J. J. Frey, formerly of Chicago, Ill., has removed to Sacramento, Calif.

THE ACTION AND CONTROL OF ANIMAL PARASITES WITH SPECIAL REFERENCE TO THE INTESTINAL CANAL*

R. P. LYMAN, East Lansing, Mich.

That the veterinarian is eminently a scientist, and because the study incident to attaining the mental and physical equipment sufficient to secure a doctor's degree in veterinary medicine, is widely recognized and generally admitted to be of a highly scientific character, has, the writer believes, as much as any other factor, aided in the rapid uplift and public appreciation of the obligations of our profession. We who have signed ourselves over (if I may so express it) to a life's work of controlling, eradicating and alleviating animal disease would fail miserably if satisfied to take the knowledge first gained and fail to keep up with advancements in scientific medicine or fail, further, to continuously re-equip ourselves to meet the ever increasing demands of the agricultural and commercial interests; no man can today be called an up-to-date veterinarian if he lacks the energy or is incapable of being stimulated to increase his store of knowledge and utility in his chosen field of effort.

Acknowledging our improved methods for handling animal diseases we must not lose sight of the fact that medicine (human or comparative) cannot even with our available information and marvellously improved laboratory facilities be adjudged an exact science and, consequently, the fact remains that many diseases to which animals fall heir, plagues if you so prefer to call them, and, indeed, the very conditions having the greatest economic importance, remain incurable or at least have such a high rate of mortality as to force us to direct attention along other channels than alleviation and cure if we would serve the best purposes. The source of relief recognized as most efficient is preventive or control medicine, based largely on the realization that health of one means health to others and for our present purposes I prefer to include diseases of parasitic origin as holding an equally important place with other common or communicable maladies of microbian or protozoan origin.

*Presented at the meeting of the Missouri Valley Veterinary Medical Association, St. Joseph, Mo., February, 1917.

In order to demonstrate veterinary responsibilities incident to agricultural progress let us view the question from three angles: the value of animals, protection afforded and annual toll from diseases, and do this by quoting a few figures compiled from federal sources. First: on January 1, 1917, the total valuation of 206,318,000 farm animals in the United States reached a sum in excess of $6,685,020,000; $664,350,000 more than for the year just preceding. Applying these figures to Missouri and thus make my references immediately applicable, if you will bear with me, I will offer further comparative data based upon livestock and veterinary estimates within this your own state. Missouri farms have approximately $300,301,000 invested in 9,485,000 animals, without reference to animals commercially employed, to poultry or pets.

Turning now to the second consideration: protection afforded through veterinary control. The last official estimate I have been able to secure indicated some 11,652 practicing veterinarians, or in other words taking the figures above quoted this means that each veterinarian has under his direct care something over 17,707 animals, not including pets and poultry, and responsibilities aggregating a valuation of $101,700.91. Observe if you will the responsibilities upon our profession and as far as statements indicate these figures refer to both licensed graduates and non-graduates. Using this comparison and turning to your own state we discover at last report 887 licensed practitioners, which means that in Missouri one veterinarian is a guardian of 10,693 animals, valued at $337,430. You will, I believe, admit the great responsibility upon the profession.

Third, the direct losses from various diseases in the United States for the year ending January 1, 1916, totaled, as near as can be estimated and it is probably low rather than excessive, the enormous sum of $222,850,000, divided among the various diseases and including something in excess of the conservative estimate of $15,000,000 from disturbances of known parasitic origin, without taking into account the indirect losses. Accepting the usual basis of a ten (10%) per cent loss (figures used by other states for a number of years) we can assume there is an annual sacrifice in each state of many millions of dollars due to animal disease that can be brought under combatable control and by so doing render untold value to agriculture.

If we would claim efficiency as students of veterinary medicine we must acknowledge the value of prophylaxis in combating animal disease and, moreover, as the morbid influence of parasites upon the animal economy does not materially differ from the results due to infectious diseases, there is apparently no valid reason why this phase of veterinary control should not receive attention equal at least to that given microbian contagion; indeed, are we not gradually coming to realize this as a necessity? Today our periodicals seldom appear without offering something referring to parasitology and its relation to animal disease. We will here only attempt to present this important subject through considering in a general discussion the actions of parasites and their control, hoping thus to intensify the interest of others in this field of veterinary science; not a new field but one until recently rather unappreciated as regards the direct effect of parasites upon the infested host, their economic importance in food values and, equally so, their direct and indirect opportunities for transmissibility of their influence to man. The influence upon the animal economy of parasitic invasion lacks uniformity even in different cases of infestation by parasites whose identity cannot be differentiated, as for example esophagostoma infestation; to some extent this can be directly attributed to the resistance of the host because, though not absent in well nourished individuals, parasites generally flourish in debilitated bodies. A host may be extensively infested without marked symptoms; the lesions produced may be only local, remain negative, or again an agency through which secondary disturbances arise by bacterial contamination of the injured region. In such instances the parasite has punctured the tissue through endeavoring to gain a stationary position because the visceral and circulatory movements make it otherwise impossible to feed or, again, the tissue abrasion is either the result of their manner of feeding or through local nutritive disturbances. The entire physique may be upset as is determined by diminished activity or listlessness; through impairment of the nutritive carrying power of blood, characterized by thinness, emaciation, later anemia and occasionally nervous disturbances. Symptoms of nervous derangement must not, however, be invariably attributed to such blood impairment for, unquestionably, the fits or convulsions discovered in young animals are quite frequently of purely functional nature, resulting from local nerve irritability and reflex influences. Equally so, the re-

searches of Weinberg would indicate that worms elaborate a hemotoxic substance from the region of the digestive tube which has successfully produced convulsive fits upon experimental animals. Elaboration of this substance undoubtedly has an influence in the general emaciation already referred to and to the diarrhea at times observed.

Parasites, worms especially, cause serious mechanical disturbance by obstructing or narrowing the lumen of the blood vessels, smaller respiratory tubes and intestinal canal; secondarily, this results respectively in arterial rupture with serious and occasionally fatal hemorrhage or in secondary embolic invasion of the body, in pulmonary occlusion and in inflammation of bowel or peritonitis where perforation follows the occlusion. The strongyli or sclerostome worms, of which we have more to say later, quite commonly cause aneurysmal dilatation of the arteries, particularly branches of the posterior aorta.

Lastly, we must not overlook the influence upon growth and development occasioned by their tendency to appropriate and extract nutrition and disturbances incident to a migratory tendency displayed by some, as for example ascaris enters the bile duct while others, through this influence, reach the same organ, the peritoneum, blood and other parts of the body.

The problem of adequate control of animal parasitism is staggering in its essential details but undoubtedly has for its foundation a knowledge of the life history of each parasite to be attacked. Probably no individual can competently equip himself with this information complete in every way and have it available for use at all times and for all forms of livestock infestation, but even so, he ought to have the subject well in hand through gaining familiarity with those indigenous to his respective locality; must know and learn how to control the source of reinfection; discover agents best adopted to stimulate the systemic resistance against invasion and, equally so, become conversant with means suitable for relieving infested animals, not failing to realize that carriers and their discharges are a constant menace to success in this effort and, likewise, have full realization that parasites of burrowing tendency are oftentimes inaccessible with the present available therapeutic agents. In a general way, though location must naturally influence our method of treatment, internal treatment, when inhalation is not indicated, resolves itself into emptying the stomach and

bowel and, following a twenty-four hour fast, administer the anthelmintic with or just previous to a laxative; following this medicine by nutritious, easily digested diet, good tonics and measures to avoid reinfection by attending especially to the manure that contaminates food and water. On places where parasitic infestation is or has long been indigenous the control measures, other than already considered, resolve themselves into repeated dosing of the young animals, this until their resistance is increased by age.

The main object of this paper is threefold: to present evidence to show that the enormous investments in livestock warrants measures tending toward relief or control of all phases of animal disease; second, that the problem of control of parasitism is too great to even assume to believe the practitioner can be an ever ready expert upon all matters relating to all forms of infestation and, third, to emphasize this latter statement by displaying details incident to a knowledge of a single species. Two parts of this thought have already been adequately considered, it now remains to demonstrate the third and for this is selected the palisade worm, *Strongylus armatus,* the most frequent parasite of the horse. According to Hutyra and Marek, Bollinger claimed "90 to 94 per cent, of all horses, with the exception of foals have a verminous aneurism." "More recent investigation, however, proves that the disease occurs in foals." Craig (Ireland) states: "During the past ten years I have found these worms in the anterior mesenteric artery in 80 per cent of all horses."

In 1901 Stickler discovered a difference of the mouth parts among worms previously grouped under the name *Strongylus armatus* and divided them into three forms. 1. *Strongylus equinus,* 2. *Sclerostomum vulgare* or *S. bidentatum* and 3. *Strongylus armatus* or *Sclerostomum edentatum.* M. Nevue Lemaire in his text "Parasitologie des Animaux Domestique" describes the worm as *Sclerostoma equinum* or *Strongylus armatus.*

Without dwelling further upon its nomenclature, this worm when mature is found in the cecum and colon where eggs are deposited and later expelled with the excrement. According to Lemaire from three to eight days following their expulsion they become highly resisting embryos or larvae that are subsequently ingested by the horse with contaminated food or water, reach the intestines unaltered and escape into the circulatory system where they produce the aneurysms upon the visceral portion of the pos-

terior aorta, particularly the nourishing arteries of the cecum. Later the parasite encysts itself in sub-mucous tissues of the intestine to pursue development, forming a nodule which presents a central orifice into the intestine through which the worm escapes when adult, thus may some of the nodules be found empty. Some are believed to develop entirely in the intestines, where mature worms firmly adhere to the mucosa.

The symptoms of this infestation depend largely upon location. When in the large intestines, even if numerous, they seldom cause trouble unless, at most evidences of an intestinal catarrh with wasting or more rarely a secondary disturbance directly attributed to toxemia and which occasionally results fatally, a condition to which our attention was called during the past month.

Circulatory obstruction is directly due to the irritating influence of the boring tendencies of the larva when attempting to adhere to the intima to thus avoid being flushed away in the blood stream; this irritation as already suggested continues on to inflammation and formation of a fibrinous deposit within the vessel. Incidental to the thrombus or aneurysm thus developed the tunic undergoes hypertrophy with calcareous infiltration of the deposit and secondary or embolic formations that, in turn, stimulate circulatory disturbances of varying intensity and characterized in the living subject by decreased velocity of the blood flow; by variation between the arterial and venous blood pressure and by anemia of the area formerly nourished by the diseased vessel. These three changes from the normal physiologic state of the circulatory system are instrumental in causing impaired nutrition, together with nerve irritability and is quite generally expressed by pain arising incident to convulsive intestinal contractions, — manifestations termed colic. That all animals infested with sclerostome larvae, where the pathologic changes are sufficient to produce symptoms of pain, do not invariably succumb to the disturbance, can be accounted for in the reestablishment of local nutrition, through anastomosing arteries within the excluded areas or, again, because the obstructed vessels subsequently dilate permitting enough blood supply to prevent tissue necrosis and the results coincident with permanent loss of peristalsis, viz: overdistention of the intestinal wall from accumulating ingesta, gas and extravasated blood. The thrombus is not always easy to discover upon post mortem examination, varying from a diameter not exceeding that of a pea, to large coagula, with free floating

prolongations, influencing dilatation and hypertrophy of the vessel into which they project from the parent mass. Most animals infested with mesenteric sclerostome larvae show loss of condition because the protracted disturbance causes chronic indigestion.

The symptomatology of this type of verminous, aneurysmal or thrombo-embolic colic lacks uniformity and cases observed vary on the one hand from mild periodic attacks of unaccountable colicky pains that disappear leaving a mysterious etiology, to, on the other, those that develop acutely into continuous painful manifestations terminating fatally after ineffectual relief efforts covering a period of from four to forty hours or, more rarely, longer. It is probably true, however, that genuine thrombo-embolic colic seldom has origin during rest but commences following work and because the increased activity of blood crowds the previously impaired vessels.

A description of the symptoms constitutes a résumé of the usual signs of so-called colic. Starting slowly or with early excruciating pain the animal is uneasily down and up, rolls or occasionally throws itself wildly about, assuming unnatural positions,—decubitus with all feet removed from the floor, a dog-sitting position, down on carpus region or stretched flat upon side. In acutely fatal cases the active symptoms of pain generally subside after an uninterrupted, rather protracted period of uneasiness, leaving the animal weakened, depressed and oftentimes in a semi-comatose state; this interval of quiet, anxiety and absence of expressed pain is later followed by signs of collapse, weak, running down pulse, muscular tremors, unsteady gait and, finally, with a convulsive effort, the animal falls apparently lapsing into a state of unconsciousness which only precedes death by a few moments. The protracted or subacute types live for four or more days but do not exhibit the severe signs of sensory and mental disturbance characterizing fulminating cases. Sweating varies but is not usually marked. Respirations increased as anxiety becomes more pronounced which later is determined by the altered expression about the eyes and dilated nostrils. The pulse at first squirty, indicating nothing other than the influence of pain upon the vasomotor system, soon shows increased frequency, is weaker and the vessels, prior to fatal termination, finally become dilated, toneless, with pulse almost imperceptible. Bloating is quite constant but lacks definite location, a fact the trocar and canula demonstrates without difficulty: moreover, if distention of walls

of the large intestine is eased by liberating the accumulated gas from within the colon or cecum, relief of pain is lacking. Abdominal auscultation reveals a primary increase but later, as gas accumulates, absence of the normal intestinal sounds, occasioned through interrupted peristalsis as is further evidenced by irregularity of defecation; protracted cases frequently show blood and mucus coated, constipated feces.

Rectal exploration here as with all forms of colic holds an important place in diagnosis. The pelvic flexure of the colon is distended, pushing back into the posterior abdomen and pelvis giving the rectum a crowded, contracted feeling: the distention extends anteriorly into the abdomen as the hand follows along the course of this organ. The cecum likewise when dilated extends more posteriorly than normal filling the pelvic cavity and lending an influence toward giving the rectum its crowded feeling during exploration; this organ is easily detected by the strong longitudinal bands. On the whole it may be stated that the abdominal distention, together with failure to discover further abnormalities on internal palpation, and the history of case without any evidence of dietary errors or exposure are factors that should cause one to suspect this disturbance, especially when these symptoms are unaccountably periodic or recurrent. Toxic cases may be rapidly fatal without showing any signs of pain but manifesting dullness, loss of appetite, paralysis, finally loss of consciousness and death leaving the nature of the malady in doubt without post mortem verification.

The therapeutic indications are two-fold: prophylactic and curative. The latter resolves itself into purely palliative measures and an anticipated high mortality. Recourse to the usual colic quieting preparations as chloral hydrate, ether, morphine or other anodynes for pain and peristaltic control measures; indeed the control of peristalsis is of prime importance to, if possible, prevent undue accumulation of ingesta about the paralyzed area and to offset the danger of torsion, displacement, etc., incident to the irregular movement of the involuntary muscles of the viscera. Because of these dangers the quick acting alkaloids as arecolin and eserin are physiologically contra-indicated. The great depression and nature of the disorder calls for general and circulatory stimulants and the trocar and canula will frequently serve a valuable palliative purpose but once used, however, it does not by any means free the bowel from future distention.

For intestinal sclerostomiasis the treatment employed for ascaris will suffice but relief is far more difficult owing to the tendency the parasite has of firmly fixing its head into the mucous membrane of the walls of the cecum. Repeated doses of turpentine are recommended by Lemaire for young animals to aid against the arterial complications and recently periodic administration of daily doses of five grains of atoxyl have been suggested for colts raised in infested places. As the embryo gains entrance into the system through ingestion of dirty, polluted water or contaminated pastures, care should be given to hygiene, recommending the use of filtered water on infested places, use of sulphate of iron sprinkled on pasture lands and control of feces of infested animals.

PERIODIC OPHTHALMIA*

R. F. AVERY, Montour, Ia.

Periodic ophthalmia, to the majority of us, is one of the most perplexing problems with which we have to contend in the practice of our profession. It not only presents difficulties in diagnosis, but also in prevention and treatment. It is not the purpose of this paper to try to set forth anything new on the subject but rather to bring about a discussion, if possible, by which we may all be benefited, and stimulate a little greater interest in the further study and observation of periodic ophthalmia.

The material for this paper has been gathered from men from various parts of the country as well as my own observations. All reports indicate an extreme prevalence of this disease during the past year as compared with previous years since nineteen hundred and eight. I have tried to sum these reports up as accurately as possible under diagnosis, cause, prevention and treatment.

To those who have seen periodic ophthalmia as our text books say it should occur, typical cases present very little difficulty in diagnosis. Atypical cases, of which we have a history of one or more previous attacks, are usually recognized from the history or from the changes that the eye has undergone. The prevalence of eye trouble, with its large percentage, proving under ordinary lines

*Presented at the meeting of the Iowa Veterinary Association, Ames, Ia., January 9–11, 1917.

of treatment to be periodic ophthalmia must lead us to look upon every case with suspicion, giving our prognosis and treating accordingly. Of cases presented for treatment, there has been everything from a mild conjunctivitis with photophobia to cases in which all the vessels of the eye and its integument were congested and the lids more or less swollen; with the anterior chamber of the eye containing a fibrino-purulent exudate with blood clots intermixed. The only cases where the eye alone is involved that we do not consider recurrent ophthalmia, are those with simple conjunctivitis without photophobia, or those in which the agent causing the irritation is plainly in evidence. Having then given to our client a probable diagnosis of periodic ophthalmia and usually a rather conservative answer as to whether the horse will lose its sight, we are met with a variety of questions as to whether other horses will get it from the one already affected, what causes it and how best to prevent it. The answers to these questions have done the majority of us more harm than the unsuccessful treatment of any number of cases of moon-blindness; because when we tell the majority of clients that it is moon-blindness they take it for granted that the patient already affected will go blind, but they do expect help in preventing its spread to other horses.

In the discussion of the cause we will not take in heredity, for it seems to be generally recognized that the breeding of horses so affected gives to their offspring a predisposition to the affection. We all probably have our own opinion as to what the actual cause is, but we are also ready to listen to any theory that sounds better than our own. An experiment that I had the privilege of conducting led to my own theory of its possible cause and how to prevent its spread. Three horses which were to be destroyed were used; one horse was affected with periodic ophthalmia and was undergoing the third attack. With a sterile syringe we withdrew a small quantity of the fluid contents of the anterior chamber of the eye affected; this material was then injected in equal amounts into the anterior chamber of one of the sound eyes of the other two horses. Horse No. 1 was placed in a poorly ventilated stall without light and one in which four horses had been known to go blind with periodic ophthalmia. The horse was fed and taken out to water twice daily; by the end of the tenth day the eye, into which the injection was made, showed it to be a typical parallel of other cases which had proven to be periodic ophthalmia. Horse No. 2 was

placed in a well lighted, well ventilated stall and allowed to run out a short time each day. At the end of the fourth day there was a slight cloudiness noticeable but this had disappeared by the tenth day; Unfortunately both horses were then destroyed; so we were unable to determine whether No. 1 would have been cleared up and had a recurrence or not. This, while it does not prove anything, led to the belief that there must be some primary cause with the exciting cause in the housing and surroundings. Basing our theory on the supposition that there was some definite factor which was communicated from one animal to another and that the surroundings were the exciting cause, a little further investigation showed that quite frequently in stables where two or more horses had been affected, they were horses worked in a team or standing in a stall together.

There were found to be several conditions which seemed to act as exciting causes. Three cases were found in horses that had been driven considerable distances facing a severe wind; all were presented the same day. Under varying forms of treatment these cases all proved to be periodic ophthalmia. Most cases were in horses stabled for considerable periods in semi or total darkness with poor ventilation. In two instances horses were brought in from pasture presenting typical symptoms of recurrent ophthalmia. One of these was found to have been playing across the fence with another horse almost blind in one eye. The other case had been by herself for two months and no cause of any kind could be determined. Dentition apparently has very little to do with this disease as there are as many mature horses affected as colts and young horses.

In stables where successively several animals had gone blind, it was possible to stop the condition by recommending a thorough cleaning and disinfection of the stalls and the installing of enough windows to properly light the interior. In most barns the windows were well distributed and were used for ventilation as well as for lighting.

The treatment, one that was recommended and used with varying results several years ago, seems to get favorable results in a reasonable number of cases. The method that we employ is the injection of compound solution of iodin into the extra-orbital adipose tissue. The amount injected depends on the severity of the attack but usually two drams are used. The syringe should have an inch

and a quarter needle and the land mark for the injection, the center of the depression just above the eye, the needle being directed downward and backward. Cases undergoing the first attack clear up in about two weeks and remain clear. There is some danger of unfavorable results where the horse is kept at work and the light not properly excluded from the affected eye. Horses treated during the second attack will not as a rule be affected again but will sometimes be left with a blue eye and prove to be the worst kind of shyers.

To sum up we may say that it is not possible to differentiate all primary attacks of periodic ophthalmia from other eye diseases and must, therefore, look upon all cases with suspicion. It may be largely prevented by sanitation and isolation of affected animals. Treatment is successful in the early stages and probably will not do harm in any case.

"'CONTAGIOUS ABORTION' INFECTIONS OF ANIMALS AND MAN"*

G. A. Roberts, North Carolina Experiment Station, Raleigh, N. C.

I am almost tempted to apologize for the selection of this subject, for having discussed it so frequently in my own State (N. C.) I would be compelled to do so there. However, I am quite sure that if there are a few of us over zealous concerning the extent and magnitude of results from such infections, the majority of veterinarians do not even yet begin to appreciate the full significance of such. Much of what has been previously said will therefore bear repeating. I have included mankind in the above title for the reason that I am likewise convinced that many have overlooked—purposely or otherwise—the fact that like results, as in animals, occur in mankind from similar specific infections. While what I have to say is largely applicable to horses, sheep and swine, it is with special reference to cattle. My excuse for presenting this subject is because of its vital economic importance.

Name: Like many, yea most of our diseases, the applied name or names are very inappropriate and a new one should be coined. We have selected the above for its "inclusiveness", wishing to indi-

*Read at the first annual meeting of the Southeastern States Veterinary Medical Association, December 27, 1916, Atlanta, Ga.

cate by it that as in several diseases, many "typhoid Marys" showing no visible signs of disease may go unrecognized, as well as to note the manifold different effects that may result from a single or dual infection.

PREVALENCE: It is perhaps impossible to state with any degree of accuracy, the extent of these infections, but suffice it to say that it is very general in this and other countries. Much more frequent, as above stated, than thought by most of those having made no special investigation as to its prevalence. There are few, if any, specific infections more general.

LOSSES: The losses, direct and indirect, are enormous, comparing favorably—or unfavorably—with cholera, tuberculosis, etc., if not heading the list, in gross losses among dairy cattle in particular.

PERSONAL OBSERVATIONS: My first acquaintance with positive cases of infectious abortions occurred some twenty years ago, but my first real experience with it was fifteen years ago in a pure-bred short horn herd in Missouri, where over ninety per cent of the pregnant cows aborted, with a loss of more than one hundred calves, within a few weeks' time.

Nearly fourteen years ago, I went to the A. & M. College at Raleigh, N. C., where we soon had enough abortions in the college dairy herd to designate them "contagious". The history of abortions in that herd has been very interesting, though many have observed like experiences. The first year we thoroughly cleaned up, disinfected, whitewashed and administered phenol in various ways. Much to our gratification the abortions soon ceased and few others occurred until the following spring. Again we treated as before, with like results. The third year, however, we were away at the time most of the abortions occurred and no special effort was made to control the trouble, but the abortions abruptly ceased in a like time as they had done both years before. Since that time, some years efforts were made as at first to control the abortions other years nothing was done with practically the same results during the years not treated as when treated. However, coincidentally or otherwise, fewer troubles have occurred since introducing few new purchases into the herd—though cotton-seed meal has been fed just as heavily.

ETIOLOGY: No doubt *B. abortus* in cattle plays a large part in producing the results attributed to this form of infection, yet I

shall not be surprised to learn some day that either dual infections are common or essential (as we are finding in many other diseases) or still other independent organisms are capable of producing some or all of such results. We readily admit that attributing any results, except a few abortions, to this infection is quite foreign to earlier conceptions, yet we are likewise frank to state that while there may be other causes than those associated with "contagious abortion" *per se,* the most satisfactory explanation to my mind, for the closely related troubles to contagious abortion, is that of infection.

Avenues of Entrance: Little by little, additional information has been added to our knowledge concerning this infection and its varied results. I believe that Drs. Schroeder and Cotton have added another valuable link to our chain of knowledge in assuming from their investigations, that a frequent if not most common, mode of infection with *B. abortus* into an adult body is through the cow's teat.

Residence in Body: *Adult*: Schroeder and Cotton likewise found evidence to believe that the normal habitat of the *B. abortus* is only in the udder and the gravid uterus, the organism disappearing from the uterus shortly after parturition. That it is rarely ever found in males.

Fetus: In apparently normal calves from cows showing infected udders, the *B. abortus* was found in most of the viscera, the blood and subcutaneous extravasations of serum.

Symptoms and Diagnosis: The symptoms or visible evidences of the infection are largely to be determined by observing some of the more grave possible results of the infection such as abortions, retained placentae, endometritis, many sterilities, nymphomania and possibly associated infections resulting in mammitis and calf troubles in the form of scours and pneumonia. While several of these features may coexist in the herd, one of them only is likely to be more predominant than the others, though at times they may be more or less equally prevalent. As with several other infections, some animals may show no visible clinical symptoms or lesions.

All cases of infection by the *B. abortus* cannot be detected by serological tests, however, a majority can be recognized by the agglutination or the complement fixation test.

Abortion: Nature has made wonderful provision against any premature expulsion of the contents of a gravid uterus and

such does not occur unless under unusual circumstances. Those of us who have observed the rough handling especially of pregnant range animals, can appreciate the necessity for other factors than excitement and injury to cause such results.

Again, with the utter failure of so-called abortifacients as ergot, gossypium and pituitrin to produce abortions, we are naturally inclined to believe that the cases attributed to other drugs and many feeds are purely coincidental.

On the other hand, to us premature expulsions are satisfactorily explained on the basis of a uterine inflammation resulting from an infection or from a mechanical opening of the cervix simulating normal parturition.

Retained After-birth: Again, with the knowledge of the anatomy and physiology of the placentae, it is impossible for us to conceive of retentions other than from inflammations resulting from infection. If abortion has occurred before the fifth month, the villi will be very short and rudimentary hence little or no retention can occur. On the other hand, the most tenacious retentions can occur at full term, or overtime, with the greatest development of the villi and the greater amount of inflammatory products.

Sterility: Sterilities, temporary or permanent of the female, are due with few exceptions, to ovarian trouble or alterations of the mucous membranes, or their secretions, of the genital tract. Two conditions of the ovaries are quite common, often resulting in sterility, namely: the presence of a persistent corpus luteum and cystic degenerations. The normal function of the corpus luteum seems to be to inhibit ovulation and the persistent corpus luteum often effectively does so. The cystic ovary likewise apparently inhibits ovulation and often leads to nymphomania.

The alterations of the mucous membranes, or their secretions, cause destruction of the spermatozoa, prevent lodgment to a fertilized ovum or gives a very insecure attachment resulting in a very early unrecognized abortion, but not observed as such, would be suspected as sterility rather than early abortion. Here again, the theory of an infection offers a plausible explanation for most of such conditions.

In passing, I should like to remark that as Schroeder and Cotton seldom found *B. abortus* infection in males, likewise there is comparatively very little male sterility among animals—including stallions.

CONTROL AND TREATMENT: The control of the troubles resulting from such infections is to be sought largely in recognizing the infected animals by serological tests and the employment of hygienic and sanitary measures.

Treatment will depend largely upon the form of the disease resulting from the infection but most of the results will be beneficially modified by the measures applicable to treating of sterility. Most of the ovarian troubles, if not corrected by nature in time, will only be benefited through rectal and vaginal massaging of affected ovary, or in some cases, by single oophorectomy. Likewise, if nature does not correct the mucous membrane troubles, frequent mild irrigations by aid of instruments such as recommended by Dr. Williams should be resorted to.

CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."

FORMALIN IN THE TREATMENT OF MASTITIS*

J. N. FROST, Ithaca, N. Y.

For our purpose we will divide mastitis into two groups particularly as to cause: first, mastitis caused by infection of various forms; second, mastitis due to other causes than infection. It is of the first group that we wish to speak.

In attempting to overcome the infection I had used the injection of boric acid solution, also oxygen gas without satisfactory results. I had tried the injection of equal parts of alcohol anl glycerin as recommended by Schmidt of Denmark. This likewise was not satisfactory and in some cases seemed to increase the infection.

In treating diseases of the respiratory and genito-urinary tract we use antiseptics which, given per mouth are eliminated through these tracts. Why then should we not treat infection of the udder in the same way?

In reporting for the committee on therapeutics at the 1914 meeting of the New York State Veterinary Medical Society, I re-

Presented at the ninth annual Conference for Veterinarians, Ithaca, N. Y., January 15 and 16, 1917.

ported the good results obtained by feeding methylene blue in cases of mild infection of the udder. I also used methylene blue in combination with turpentine which is likewise eliminated through the milk.

At the 1913 meeting of the American Veterinary Medical Association, Dr. Klein gave a paper on "The Therapeutics of Parenchymatous Mastitis," in which he tells of using boric acid per mouth and finding it in the milk in twelve hours. He also speaks of using urotropin and finding formaldehyde in the milk in twenty-four hours.

At the conference last year Dr. Moak in speaking of streptococcic mastitis gave the impression that it was incurable but later in speaking with him I was unable to find any definite line of treatment which he had used. I had already cured some cases of streptococcic mastitis with turpentine and methyline blue but realized that something stronger was needed.

It was then I decided to try formalin and the results were so gratifying in the first case that I began a series of experiments with regard to elimination and dosage.

Quitman gives the dose for the cow as 15 to 30 minims and advises not to continue the use over too long a period as it is supposed to lessen or dry up the secretions from the gastric and intestinal glands and thus produce constipation or impaction.

With the idea of avoiding this we began the dosage at one dram three times a day and alternated with one ounce of turpentine twice daily. As this produced no bad effects we gradually increased the dosage until we believe the correct dose to be one ounce daily.

We have given 25 c.c. twice daily for two weeks and failed to see that it has produced bad effects in any way, either by loss of appetite, constipation or impaction. This cow at the time was being fed on dry hay and grain. We have also given 50 c.c. at one time without bad effect.

As to the method of administration we have given it undiluted in capsule. It may also be given in milk or oil. In combination with the latter we get the laxative effect of the oil which would be beneficial in treating mastitis.

Elimination: In determining the length of time after giving formalin before it was excreted in the milk we used Leach's hydrochloric acid test for formalin. When one dram of formalin was given faint traces could be found in the milk in twenty-four

hours. When 25 c.c. of formalin was given three hours after water and seven hours after milking it was found in the milk two hours afterward and continued to be present for forty-eight hours. The largest amount was present from the eighteenth to the thirtieth hours.

We believe it advisable to supplement the formalin treatment with purgatives and diuretics as they increase the interchange of blood in the udder and hasten the elimination of waste products from the body. It is also well to use the suspensory bandage to relieve the weight and tension on the tissues. Then by placing cotton inside the bandage and keeping it hot by applying water the pain in the udder is materially reduced. When left for the night the wet pack should be changed for a dry one to prevent the chilling of the udder. In hot weather cold water may be used in place of hot with equally good results.

In our work with formalin we have not used the above methods except in two cases where the animal was necessarily changed from ensilage to dry hay and in these cases salts were given to relieve any constipation which might result.

In giving the results of our work with formalin, we give one from each of the different forms with which we have been experimenting.

Case 1. Cow had calved eight months previously and was pregnant about four months. For the past two weeks she had given thick milk and the two posterior quarters were hard and firm. Cultures made from the milk of this cow were sterile from the fore-quarters and from the hind quarters showed a pure growth of streptococci. The animal had been treated with home remedies and cow relief.

Gave one-half ounce of formalin and then followed by one dram dose three times daily alternated with one ounce of turpentine twice daily. Eight days later the treatment was discontinued and on the ninth day cultures from the milk of all quarters were sterile. Five months later, after the cow had again freshened the cultures were again sterile and the animal averaged over one hundred pounds of milk daily for forty days.

Case II. Cow had calved about four months previously and had been giving thick milk for five days. Cultures from the milk gave pure growth of streptococci from one quarter, mixed growth from another, a pure growth of micrococci from the third and a

sterile culture from the fourth. Gave one-half ounce formalin followed by one dram three times daily for five days. Cultures made from the milk on the ninth day were sterile.

CASE III. Cow had freshened four days before and had retained placenta. Was giving bloody milk from two posterior quarters. Cultures showed *B. coli* and micrococci. Gave twenty-five c.c. of formalin and repeated for three days. On the sixth day the milk was normal.

CASE IV. About one year ago cow had shown a small swelling at base of teat. Two weeks previous to our treatment the swelling had suddenly increased in size and at time of treatment was about three inches in diameter. The swelling was punctured with a hypodermic needle and a thin straw-colored fluid escaped. Cultures from this revealed pure growth of streptococci. Cultures from the milk of that quarter showed no growth. The abscess was opened and packed with iodoform gauze; the wound covered with sterile gauze held in place by adhesive tape. The second day after the abscess was opened the milk from that quarter became thick. Cultures from that quarter showed streptococci which had undoubtedly passed up the milk canal. Gave twenty-five c.c. of formalin and on the third day the milk was normal to all appearances but no cultures were made. Ten days later the milk became thick and cultures showed a growth of streptococci. This time twenty-five c.c. was continued daily for three days and on the fifth day the milk appeared normal and cultures were sterile.

CASE V. Cow had been milking hard for a few days and the trouble was gradually increasing. A small amount of exudate was found on end of teat forming a scab. After removing the exudate the external orifice was found to be normal. Further examination showed a small swelling in the teat canal, at the upper end, which was producing stenosis of the teat and causing hard milking. Cultures from the milk of this quarter showed micrococci and *B. coli.* Gave twenty-five c.c. of formalin and repeated in twenty-four hours. Also painted the base of the teat with tr. iodin and had the exudate on the end of the teat softened with warm antiseptic solution before each milking. Four days after the owner reported that the exudate had stopped forming and the milk was flowing more easily. Two weeks later he reported the cow milking very well.

Much credit is due Dr. Pickens for making and examining the cultures and also to Dr. Hayden for testing the milk for formalin.

FORAGE POISONING*

CHARLES THOMPSON FAKE, Granville, N. Y.

The above heading I believe to be very similar to our much abused term "colic", in that it is commonly used to cover a multitude of evils. Certainly it has received a number of designations, among which the principal ones are blind staggers, sleepy staggers, food poisoning, mould poisoning, cerebritis, epizootic cerebrospinal meningitis, epizootic encephalo-myelitis, leuko-encephalitis, and according to Hutyra and Marek in their last edition, enzootic meningo-encephalomyelitis, or Borna's disease. I, however, shall confine myself to the name forage poisoning, for while this term has its limitations there seems to be little data on which to base any absolute name.

HISTORICAL. Diseases of this character appeared in the old country in 1813: in America it was probably first noted by Large in 1847 and by Liautard in 1867. It has prevailed enzootically in various parts of the United States for the past twenty-five years, the most extensive losses having been in the west and southwest The outbreak in Kansas in 1912 was the most extensive yet experienced.

OCCURRENCE. Forage poisoning generally follows abnormal climatic conditions which tend to cause rank or quick growth of roughages. The disease appears in sporadic, enzootic or epizootic form, mostly in the fall and winter months, being most prevalent following seasons of heavy rainfall.

ETIOLOGY. Hutyra and Marek state that this disease is caused by infectious substances the nature of which is not known. With forage poisoning as with all other diseases of which we are not specifically sure, there are numerous causative agents named by as many different authorities. These agents embrace the micrococcus, diplococcus, streptococcus, while the filterable virus has also been accused. Our knowledge of bacteriology, while not to be compared with that of the gentlemen doing bacteriological work, is nevertheless sufficient for us to realize that bacteriological examinations might easily show the above mentioned organisms without proving their specific connection with the disease.

*Presented at the meeting of the Vermont Veterinary Medical Association, January, 1917.

Diseased animals have been associated with healthy ones, watered at the same tub, and fed from the same box without contracting the disease. However, different feed was given and the animals thus exposed when subjected to the same roughage for a period of three weeks contracted the disease. The statement made above is based on experimental work carried on during the Kansas outbreak, but does not point to a contagious nature of the disease. I believe forage poisoning to be due to a slow developing toxemia generated from the roughage. This statement to apply only to the cases I shall cite hereafter from my practice.

SUSCEPTIBILITY. Horses mostly are affected, less frequently mules, but the condition is sometimes observed in cattle, sheep and hogs. Age, sex, etc., have no apparent influence on the susceptibility, although Hutyra and Marek state three to seven years to be the most susceptible age.

SYMPTOMS. Disturbance of central nervous system, staggering gait, closing of eyes, etc., excitability may be present. Congested conjunctiva, paralysis of throat and tongue are also noted. The temperature varies with the case, the excitable cases carrying high temperatures, but the ones I believe I have had have all carried sub-normal temperatures, some as low as 96 degrees. The pulse varies with the course of the disease but unless excitable symptoms are present it is generally slow. Death generally occurs in from twelve hours to six or seven days. In the latter stages of the disease delirium is present in some cases while in others a deep comatose condition continues to the end.

PROGNOSIS. Recoveries rarely exceed 5 per cent of infected animals. I have had twelve cases with eleven deaths, and the last case not reported.

COURSE. Forage poisoning may terminate in death in from ten to twelve hours, but as the disease progresses, the intensity of the symptoms diminish and the later part of the outbreak may have cases extending over several days with some recoveries.

LESIONS. Early cases that expire inside of twenty-four hours show practically no microscopic lesions considering the intensity of the symptoms. Secondary lesions in cases of long duration are noted. Pharyngeal and laryngeal infiltration, muco-purulent discharges from eyes and nose and enteritis may be present.

Microscopic lesions are confined to the central nervous system, there being round cell infiltration around the blood vessels of gray

and white matter in the cord. Degeneration of motor cell centers is also noted.

DIAGNOSIS. Microscopical examinations are sometimes necessary to differentiate this disease from other diseases of the nervous system. It is not easily differentiated unless specific examinations can be made microscopically.

TREATMENT. I have found no record of successful treatment. One author says it is almost hopeless, and another that medicinal agents have proven of little value.

CASE REPORTS. Dec. 1st. Farm of Merrit Barden, West Pawlet, Vt., first animal taken Nov. 30th, died same evening. No veterinarian called. Second animal showed symptoms night of Nov. 30th: I saw case next morning. Called trouble forage poisoning: administered purgatives, and left strychnine to be given every two hours. Animal died next morning. Two other animals in same stable showed symptoms during day or evening of 1st of December. Third animal died December 6th, after showing nasal discharge and purulent discharge from eyes. Third animal taken at time of second seemed to be better for a time but did not eat and after a few days was taken worse and died on December 12th. This animal showed pronounced nasal discharge and great congestion of visible mucous membranes. The animals above that were treated by me all had sub-normal temperatures, and at no time did I find any fever.

Dec. 2nd. Farm of Jas. Montieth, North Hebron, N. Y., call came in A. M. Found two animals down. Both had been used day previous and had appeared normal. Subnormal temperature present in both cases and paralysis of hind parts very pronounced. Urine normal in appearance, pulse slow: indications of pain very slight. One of the above animals was dead the next morning: the other lived two days and developed discharges mentioned in the other cases. Third animal on this farm taken on morning of 4th of December, the case was more prolonged but the animal died on the 10th of December. There was a fourth animal in this stable that did not contract the disease. Was getting a different grain ration and was a light hay eater.

Dec. 9th. A bay gelding the property of a butcher at West Pawlet, Vt. Worked the day before and found down in the morning. Symptoms same as other cases. Died evening of 9th and was

posted by Dr. Rich and myself on December 10th. Post-mortem changes had taken place and our findings were of no help to us. Another horse in this stable received same rations and has never been sick.

Dec. 18th. A bay mare, quite old, property of Hungarian at Wells, Vt., presented the same symptoms above described. I was called late in the afternoon, animal having been down all day. Advised owner that animal would probably die before morning. Death occurred at 3 A. M. on the 19th.

Dec. 20th. Grey gelding, property of farmer at West Granville, was used day before; found down morning of 20th; died at 7 A. M. morning of 21st. Symptoms same as before described.

Jan. 16th. Called in afternoon to see animal that was found down in middle of forenoon. Found usual symptoms. Coma became heavier toward night and the animal died the next day. This animal belonged to a farmer that was doing thrashing at different farms and the grain ration was varied.

Jan. 20th. Sorrel gelding, property of farmer of West Hebron. This animal showed staggering symptoms, sub-normal temperature, slow pulse, would take a mouth full of hay and allow it to hang from the mouth. Symptoms not as intense as in previous cases. Animal had received hay ration entirely, no grain having been fed for two months. I have heard nothing further from this case since I made my call. The horse was given heavy purgatives, and stimulants advised. To date, Jan. 23rd, nothing further has been received regarding the case.

The above brief and incomplete data cover twelve cases, eleven of which have died: the majority within twenty-four hours after symptoms were noted. All the animals above mentioned were receiving all the hay they could eat. Part of them had had second growth, and two at least were tied to the hay mow where they took all they cared for. The grain ration of the first eight animals to die came from the same mill and was supposed to be western produced grain.

PREVENTION AND TREATMENT OF HEMORRHAGIC SEPTICEMIA OF CATTLE BY THE USE OF BACTERIAL VACCINE MADE FROM THE CAUSATIVE AGENT

T. O. Brandenburg, Lakota, N. Dak.

Autumn of 1916. Seventy head of cattle shipped into the State of North Dakota and placed with native cattle.

Three were dead when we were called, all dying with a pleuropneumonia. Sixteen showed well pronounced symptoms and carried a temperature ranging from 103.5° to 106.5°. Catarrhal and pectoral forms and only a few showing slight edema.

Administered 2 c.c. of vaccine hypodermically, 2,000,000,000. to each c.c. All showed improvement in a few days.

After 12 days, three developed the intestinal form of the disease and died.

A few weeks later 35 more were added to the herd from the yards and soon began to show symptoms of the disease.

Administered 1 c.c. to all and only one died which was well advanced at time injection was made.

I consider the vaccine an absolute preventive if properly used and curative in all cases which are not advanced.

Our experience shows that in order to establish a positive protection two injections are necessary about eight days apart.

We found the younger animals to be more susceptible to the disease and also to the treatment. The older animals developed the disease, apparently, more slowly but responded slowly to the treatment.

All deaths after vaccination were in old animals.

CHLORINATED LIME IN PRACTICE*

N. A. Kippen, Independence, Ia.

Chlorinated lime has been used for over a century as a bleaching powder, a deodorizer, disinfectant and parasiticide, due to the free chlorine gas that is so readily evolved, but has never come into general use until Dr. H. D. Dakin of the Rockefeller Institute,

*Presented at the meeting of the Iowa Veterinary Association, Ames, Ia., January 9–11, 1917.

after various experiments, has so subdued chlorinated lime as to make a neutral solution. As at first prepared it was made with sodium carbonate and boric acid; this was later modified and now the boric acid is eliminated altogether. The modified Dakin's fluid as made at the present time is as follows: (taken from the *American Medical Journal,* December 9, 1916,) take 200 grams of chlorinated lime (.25% active chlorine gas) 100 grams of anhydrous sodium carb., 80 grams sodium bicarb. Place the 200 grams of chlorinated lime in a 12 liter jar with 5 liters of water; shake the whole thoroughly two or three times and set aside over night. In another jar, dissolve the sodium carb.and bicarb in 5 liters of cold water and pour the contents of this jar at one gush into the jar containing the maceration of chlorinated lime, agitate the whole vigorously for one minute and then set aside for the carbonate to settle. After one-half hour the clear fluid is siphoned off and filtered through two layers of paper, the liquid thus obtained is then ready for use. It should be kept in a cool place away from the light. It will retain its potency for about two weeks. A suppurating wound, moistened with this solution every two hours, (care being taken that the fluid comes in contact with every part of the wound) is said to be sterilized in about 40 hours after which healing promptly takes place. Dr. Carrel is making use of this liquid in the American hospital in France; the British are using a modification of this formula which in my opinion is more suited to veterinary practice. This compound is made up of equal parts of chlorinated lime and boric acid mixed together and kept in an air tight container, for shallow wounds. The mixture can be dusted into the wound where the chlorine gas is set free and sterilizes the parts; or a solution can be made by dissolving 25 grams of the mixture in a liter of sterile water. After being allowed to stand for one hour, the clear fluid is siphoned off and is ready for use.

PRODUCTIVE INFLAMMATION OF THE FOWL DUE TO TRAUMA.

B. F. Kaupp, Pathologist, N. C. Experiment Station,
W. Raleigh, N. C.

History. A two year old hen. Breed, Mottled Houdan. This hen was a member of the station flock. The cock was a three year old bird and had suffered with a nervous affection in which his

movements were more or less stilty and difficult to perform. Several of the hens suffered trauma of the neck due to the beak of the cock during his efforts to copulate.

The specimen here studied is from a hen which apparently died from the results of the trauma.

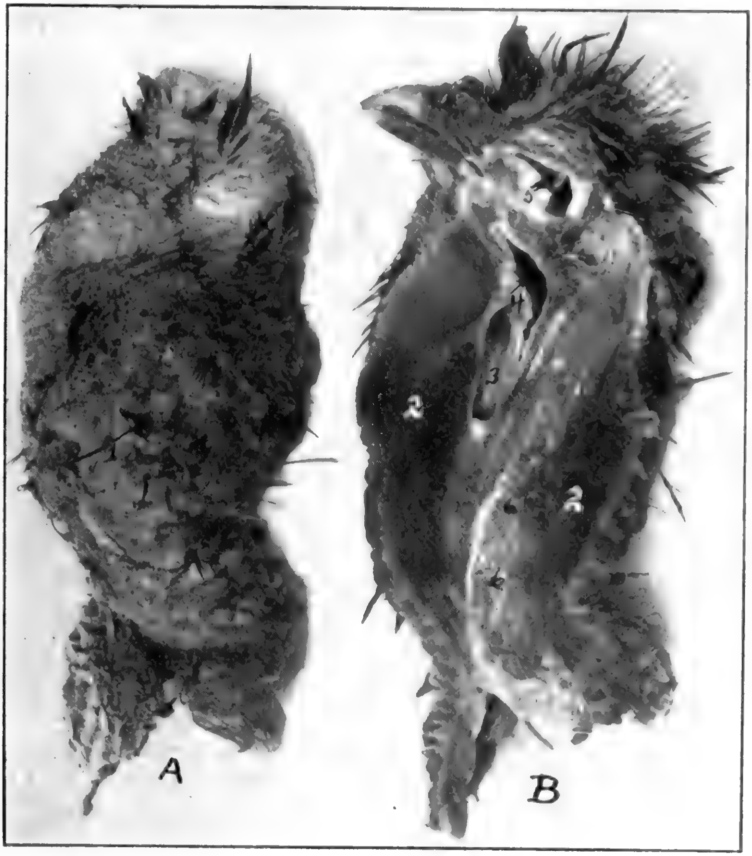


Fig. I.—Head and neck of a Mottled Houdan hen. Traumatic chronic inflammation. A, the outer surface of the neck; 1, the wounds; B-2, the sectioned surface; 3, open trachea; 4, pharynx; 5, open eye orbit; 6, vertebral segments.

PROTOCOL. The feathers were plucked from the carcass. The body was in a fair condition of flesh and appeared normal except the neck. The neck appeared enlarged throughout the entire cervical region. The surface was irregular in outline. There was

evidence of healing wounds as shown at number I A, Figure No.I. Letter B, number 2 shows the sectioned surface of the neck.

MICROSCOPIC STUDY. The areas near the surface trauma show, on the surface, a zone of embryonic cells, then fibroblasts and finally newly formed connective tissue. There is little evidence of hemorrhage though a few zones are found containing fibrin. My-

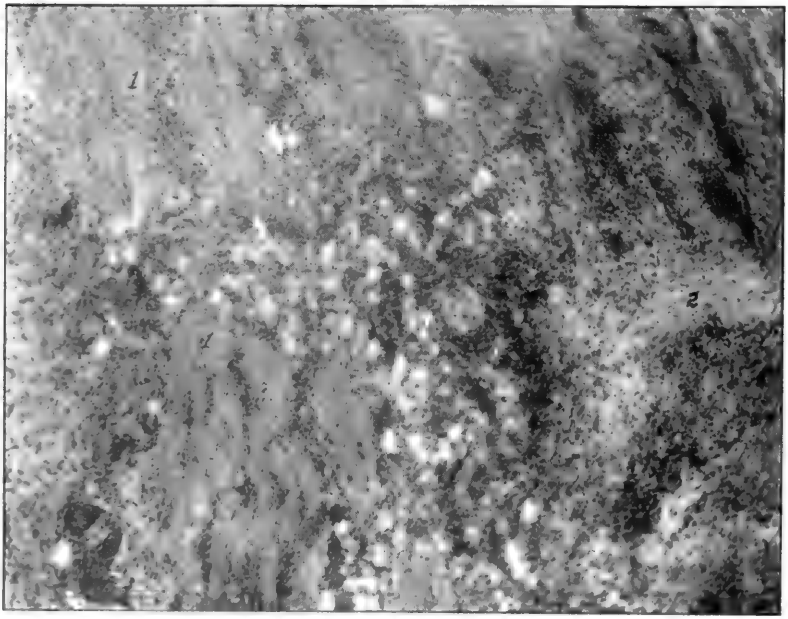


Fig. 2.—Photomicrograph of section through one of the areas at Fig. I-A. No. I, muscle fibres infiltrated with polymorphonuclear leucocytes and round cells. 2, an area of newly formed connective tissue. Many fibroblasts are still present.

riads of capillaries are found in the densely packed cellular areas. The musculature is infiltrated with cells both of a round type and polymorphonuclear variety. There is a pronounced myositis and a generalized productive inflammation.

DOUBLE FRACTURE OF THE PELVIS

Daniel O'Loughlin, Oneida, N. Y.

The specimen was a large brown gelding, 16 hands high, 6 years old, weighing about 1100 pounds and used as a race horse.

According to the history of the case, the owner was driving at a slow pace along an icy street; as he was passing a construction gang, who were repairing a canal feeder near by, the left hind foot of the horse slipped forward between the two front feet and continued in this position for a distance of about three yards. At this point he was leaning heavily on the left shaft and finally fell down. He made several strenuous efforts to get on his feet but was unable to do so. The harness and sulky were unfastened and we were called to the scene. A hasty examination was made, during which distinct crepitation of broken bones could be heard. He was very carefully moved from the street to the hospital. The owner was advised of the seriousness of the condition but was reluctant to have him destroyed on account of his value as a race horse.

He was raised to a standing position and placed in a narrow stall in slings. In this position intense pain and profuse sweating soon became apparent. He was able to bear weight on either hind leg when they were placed under him, but was unable to bear weight on both or to move either of his own accord. On moving the legs distinct crepitation of the bones in the pelvis could be heard. A rectal examination was made but very little could be discovered on account of the constant movements and uneasiness of the horse.

The symptoms became rapidly worse until he died in about an hour and a half.

The post-mortem examination revealed a complete fracture of the pelvis on both sides between the point of the ilium and coxofemoral joint.

AN INTERESTING CASE IN COMPARATIVE MEDICINE

Fred W. Porter, Tampa, Florida

On the evening of January 21, 1917 I was called by the owner, Mr. J. R. Fox to visit his captive Gorilla "Casey". On arrival I found a fully developed man sized ape whose weight was given me as 165 pounds. I was also told not to get within his reach, to which

I agreed. Under these conditions it was necessary for me to follow the lines of human medicine, i. e., look wise and ask questions. Inquiry developed the fact that I had been preceded in the case by a gentleman in human medicine and for the rest of the case we worked together. The creature was restless and was said to have shown a great deal of pain and that there had been no bowel action for four days. Urine had been recently voided. He would obey the voice of his owners, especially Mrs. Fox, for whom he showed marked affection. There was no opportunity for physical examination, palpation or any other method of close observation. To have gotten within his reach, for a stranger, would have been suicidal. With the help of his owners, we did get temperature per rectum and, using the human standard, it was within one degree of normal, later dropping to sub-normal. The diagnosis was fecal impaction and my suggestion was a high colon irrigation. As a starter, I had given him four times the human dose of an aloin cathartic, followed by frequent tablespoonful doses of refined oil, (hydro-carbon). This carried him through the night and the following day but showed no improvement. During this day (Monday, Jan. 22nd) the owner had some special harness made to confine the animal, so that a rectal injection could be made. Monday evening this was attempted in the following manner: Casey was already secured to his cage by a steel collar around his neck; a heavy chain from this collar to the cage bars. He would obey his owner's voice and by this means he was induced to lie down and his head chained fast, so that all he could do was to rotate the neck. A little more persuasive talking and the right hand was made fast at the wrist with a new, heavy strap and buckle; someone suggested that this might not be strong enough and a piece of new rope, one-fourth inch in diameter was placed as an extra precaution. Mr. Fox now went to the other side of the cage, to secure the left hand and arm. Just here Casey decided he did not want his right hand fast, so, with no apparent effort, he turned that hand over and there was no strap, rope or other fastening left. The owner's statement that I must not go near him, until he was secure, was not disputed by me at all. From now on, it was found utterly impossible to do anything with him, in the way of confinement.

Anesthesia was suggested, but Mr. Fox said that had been attempted on a former occasion, when some dental work was considered necessary. That at that time eight pounds of chloroform

had been used, with the cage closed up and the only effect was that Casey took the wads of saturated cotton and made a pillow of them. The animal died about midnight of Monday the 22nd in great agony. A post-mortem was asked for and consented to by the owner and the following conditions found: Peritoneum one-fourth to one-half inch thick, marked chronic inflammation. A quantity of purulent fluid was found in the abdominal cavity, great colon, both ascending and descending loops, empty. Numerous adhesions among coils of small intestine. Bladder normal and empty. Vermiform appendage entirely obliterated and the remains of an abscess found that must have held fully a pint of pus. Adjacent intestines, one mass of adhesions.

The condition was evidently one of long standing and had gone unobserved because the animal could not make his troubles known and would not stand for much familiarity even from Mr. Fox. He had done his usual performances up to a week of his death. Had been exhibited in New Orleans, put on board steamer and brought to Tampa and was first noticeably sick on arrival here.

This ape was an animal of very marked intelligence. He had no intelligible language, but he could and did make sounds that his owner understood meant certain things and he did understand what was said to him, regarding objects around him, even if these objects were new and unfamiliar. His age was given as 16 years.

—MORE TERRITORY FREED FROM TICK QUARANTINE. The Federal tick quarantine was raised on March 1 from four counties in North and South Carolina. A total of 3,446 square miles is affected by this order. The counties freed are Duplin and Pender in North Carolina and Clarendon and Orangeburg in South Carolina.

These are the first areas to be released from quarantine in 1917. More than 42 per cent of the territory originally infested with the tick has now been freed from the pest and released from quarantine. Active work is planned for this year in every state in which the tick exists, and very considerable reductions in the quarantined area are expected in the course of the year.

—Dr. F. S. Schoenleber, for 12 years Dean of the Veterinary Department at the Kansas Agricultural College, Manhattan, has resigned. His plans for the future have not been announced.

ABSTRACTS FROM RECENT LITERATURE

INFLUENCE OF COLOR IN HORSES ON THE CURE OF MANGE. Masur. *Berliner Tierärztliche Wochenschrift*, 32nd Year, No. 24, p. 294, Berlin, June 22, 1916. Abst. in *International Review of the Science and Practice of Agriculture*, Year VII, No. 8, August 1916, p. 1128.—When treating numerous cases of mange, it was observed that the color of the horse has some influence on the cure of the disease. Cure was completed most rapidly in black horses, where often no formation of crusts even was observed. To cure them it was mostly sufficient to rub them with some ordinary remedy. In bay horses, cure required a greater length of time. In chestnut horses, the treatment had almost always to be repeated. In white horses, above all those with a uniform coat, treatment repeated a second time did not always bring about a cure, which observation was confirmed by other veterinary surgeons. These results were not affected, no matter what drug was resorted to for cure.

The writer is at a loss to explain exactly the cause of this phenomenon, but he thinks acarids enter more easily and more deeply into the skin containing no pigment and are thus more difficult to get at by the curative agent than in animals with pigment.

REICHEL.

CALCULUS IN THE KIDNEY OF A DOG. Country Veterinarian. *Veterinary Journal.*—A four year old retriever had difficulty in micturating. He was dull, slightly stiff behind in walking, his temperature was 103°F. Bowels were active and appetite good; he passed water without straining. Diuretics and small doses of a purgative were prescribed. The next day he seemed improved but the temperature was higher one degree. He had no passage of urine nor of feces during the day. He suffered no pain, breathed normally, the pulse was normal. From the floor of the abdomen, on each side, there was a fairly hard swelling. Oil, diuretics and enemas were prescribed. No effect was produced. Resin made into a soap bolus and four purging pills were ordered. Death followed during the night. In the abdomen there was a bloody colored fluid, the bladder had thickened walls and was a quarter full. It had a small aperture the size of a pin's head through which urine could be squeezed by pressure. Kidneys were enlarged, each contained a calculus, one about the size of a haricot bean and the other flat and rough on its surface. LIAUTARD.

FILIFORM DRAINAGE IN VETERINARY MEDICINE. P. Morel and V. Le Page. *Recueil de Médécine Vétérinaire,* Vol. 92, pp. 389-392, 1916.—The results obtained by Dr. H. Chaput with filiform drainage induced me to try this in veterinary medicine. The simplicity of the operation, etc. attracted my attention.

"Filiform drainage consists in favoring the escape of liquids coming out of wounds, abscesses, fistulas, and natural or pathological cavities, by means of threads of a varying nature and volume." (Chaput).

The author has used metal wires, silk, and rubber urethral bougies. Horse hairs taken from the tail were also used; these should be immersed for several hours in a strongly antiseptic solution before use. (permanganate or cresyl). Drains were used that went through the cavities. In order to pass the wires, openings were made with a bistouri, or more often, with iron needles, straight or curved. Each drain was composed of 4 to 10 horse hairs which were moved several times a day.

The treatment of several horses is described in detail; excellent results were obtained. The openings were small and painless, the cicatrices were pliable and not sensitive. Cold abscesses were treated with particularly good results. BERG.

JEAN BAPTISTE AUGUSTE CHAUVEAU. From *The Lancet,* No. III, of Vol. 1, 1917, No. 4873, Vol. CXCII, January 20, 1917, p. 121.—Auguste Chauveau, whose death in his ninetieth year we recorded last week, had outlived all his famous co-workers of earlier years. E. J. Marey had long predeceased him, while Charles Bouchard, his coadjutor in founding the *Journal de Physiologie et de Pathologie Générale,* died October, 1915. Associated thus in the direction of an influential journal, the spheres of activity of Bouchard and Chauveau were yet widely different: the former was an eminent and well-beloved physician, the latter will be remembered as a many-sided biologist and one of the makers and masters of physiology during the latter half of the last century. He was also a great comparative pathologist, doing pioneer work on various contagions, including tuberculosis, which had an intimate bearing on practical and preventive medicine. His energies, however, were not confined to this borderland between pathology and medicine, for he became a fine exponent of veterinary medicine.

Auguste Chauveau was born at Villeneuve-le-Guyard (Yonne)

on Nov. 23rd, 1827, and, like many other provincials, gravitated to Paris, where he studied at Alfort—the great veterinary school just outside Paris—and also in the Faculty of Medicine of Paris, as well as at the Veterinary School of Lyons. He was elected on the staff of the Lyons Veterinary School at the age of 21, and ultimately its director in 1875. His wide knowledge of the subject led to his appointment as inspector-general of the veterinary services in France. Later on his keen interest in the advancement of physiology and pathology found a new and wider sphere on his appointment as professor of comparative pathology at the Natural History Museum in Paris, where he built an entirely new institute for the study of comparative physiology and pathology. In Paris Chauveau took an active interest in all that went on in the medical societies. He was a member of the Institute at the Academy of Science, where he sat not as a physiologist but in the agricultural economy section, just as Pasteur did not sit as a chemist, but as a representative of mineralogy. He was also a member and regular attendant at the Academy of Medicine, as well as at the Society of Biology, of which he was at one time president. At these gatherings his genial presence and bonhomie, his interest in all newer scientific work, and also the younger workers themselves, made him a highly popular figure.

Chauveau's published writings cover a very extensive field. Some of the more important may be mentioned. In 1868 he published his "Nature des Virus", showing the "corpuscular state" of the virulent agents and the inactivity of the fluid in which they float. This was based on an earlier essay, entitled "Sur la Nonspontanéité des Maladies Virulentes." In the same year appeared a series of important studies on tuberculosis dealing with its virulence, the transmission by way of the digestive tract, and its contagious character in animals and man. Papers followed on the mechanism of natural contagion, on the attenuation of viruses and preventive inoculation, on the presence of pathological microbes in blood, in persons apparently in good health, on cow-pox and its relation to small-pox. Puerperal septicemia and gangrene were also studied. While still at Lyons he published his "Traité d'Anatomie Comparés des Animaux Domestiques," the second edition of which, revised and augmented by S. Arloing—at that time professor in Toulouse—was translated into English by the late Professor George Fleming and published in 1873. Bio-chemical prob-

lems also attracted him. He and his pupils did work on glycogenesis and on the formation and use of sugar in the organism. With Kaufmann in 1886 he attempted to solve the problem whether circulating sugar can be immediately utilized by active muscles. They came to the conclusion that an active muscle, such as the masseter of the horse, uses about three and a half times as much blood sugar as the corresponding resting muscle—results confirmed later by Quinquaud in 1886 and by Morat and Dufort in 1892.

It is, however, as the explorer of the movements of the living heart that Chauveau will probably be best remembered. As a contemporary of Ludwig and co-worker with Marey, his earliest researches were devoted to the study of the different phases of the cardiac cycle and the intracardiac pressure, the observations being made on the heart of a horse by means of the now classical cardiac sound of Chauveau and Marey, utilizing Marey's method of air-transmission of variations of pressure by means of tubes and recording tambours. Probably few of the younger physiologists in this country have seen such an experiment, but as recently as the International Congress of Physiologists at Liége Chauveau repeated this famous demonstration. The horse quietly munched its oats in the stable below, while the movements of its heart were recorded in the auditorium above. The main results of this work were published in a little brochure, entitled "Nouvelles Recherches Expérimentales sur les Mouvements et les Bruits Normales de Coeur," by Baillière in 1856. Fuller details may be found in Marey's "La Circulation du Sang." In 1860 Chauveau constructed, with Lortet, the haemodromograph to measure the variations in the velocity of the blood in large arteries. Among other results they recorded the increase of velocity of the blood during systole of the left ventricle, and the increased rate of flow in the carotid artery during mastication.

Chauveau's personal characteristics made him widely known outside his immediate circle. He had a gracious and commanding presence. His massive, almost leonine, head, set on a powerful and strongly built body, made him a striking figure on public occasions. He was a great friend of the late Sir J. Burdon-Sanderson, and some of their work was done in the same region of physiology. Allusion has already been made to his catholicity of outlook and his encouragement of the work of younger investigators. Chauveau's long life was dedicated to the advancement of knowledge,

and his memory will live as truly in the work which his encouragement and inspiration produced at the hands of his pupils, as in his own many-sided achievements. REICHEL.

CONTRIBUTIONS ON OX WARBLES. (*Mitt. Ausschusses Bekämpf.* Dasselplage, 1912, Nos. 1, pp. 28; 2, pp. 16, pls. 4; 3, pp. 37, figs. 10; 4, pp. 26, fig. 1; 1913, No. 5, pp. 39, pls. 4, figs 2; 1914, No. 6, pp. 31). Abst. in *Exp. Sta. Record,* Vol. 35, No. 3, p. 282.—These several contributions relating to ox warbles are as follows: (1) Ox Warble Injury and the Removal of Ox Warbles, by R. Krause; (2) Ox Warble Flies, by H. Gläser; (3) Investigations of Hypoderma Larvae, by Peter; Ox Warble Removal, by Schöttler; and Warble Flies: The Egg and Oviposition of the Large Warble Fly (Hypoderma bovis), by H. Gläser, previously noted (E. S. R., 29, p. 761); (4) Warble Flies: Observations on the Life History of the Large Warble Fly (H. bovis) and Rearing Experiments, by H. Gläser, previously noted (E. S. R., 29, p. 761); (5) Warble Flies: New Investigations of the Life History of Both Ox Warble Flies, by H. Gläser; and (6) Warble Removal Experiments on the Neuhaus an-der Oste District in April, 1913 (pp. 3-16), and Warble Removal in Oldenburg in 1913 (pp. 17-25), by Schöttler and H. Gläser, and Experiments Which Show That the Warble Larvae Cause a Loss of Flesh of Cattle, by H. Gläser (pp. 26-31). M. J. HARKINS.

ON THE TREATMENT OF TETANUS IN HORSES. Major Veterinarians Poinsingnon and Dignac. *Revue Generale.*—This is the record of a case, which occurred in a mare after a deep punctured wound of the foot, and had been treated after the administration of an injection of anti-tetanic serum and by rectal injection of chloroform. The mare had been placed in slings. After nine days of treatment the tetanic symptoms subsided, but a complication took place in the left hind leg. This became the seat of such muscular atrophy, especially of the gluteals, triceps, cruralis and adductors of the thigh and of the leg, that soon the ilium itself became deformed and its external angle appeared to have dropped several millimeters lower than the one of the opposite side. All treatment of serum and chloral injections had been discontinued but the mare, not yet fully free from tetanic symptoms, was merely kept in slings until she was able to use her left

hind leg; then she was turned out to complete her convalescence. For the authors the use of slings is one of the essentials in the treatment of tetanus. LIAUTARD.

A CASE OF SEPTICEMIA IN MAN PRODUCED BY STREPTOCOCCUS EQUINUS IN THE ANGLO EGYPTIAN SUDAN. A. J. Chalmers, Director Welcome Tropical Research Labs. and George Haddad. *Journal of Tropical Medicine and Hygiene,* Vol. XVIII, No. 23, pp. 265-266, London, December 1, 1915. Abst. copied from *International Review of the Science and Practice of Agriculture,* Year VII, No. 2, Feb. 1916, p. 189.—A fatal case of Septicemia is recorded in a young Sudanese of 20 years, caused by *Streptococcus equinus* (described by Andrews and Horder in 1906). Probably the infection took place from horse dung through a wound. *S. equinus* was obtained in pure culture from the venous blood of the victim.

This is the first record of *S. equinus* pathogenic in man and of its occurrence in tropical countries. REICHEL.

A CASE OF ADENITIS IN THE HORSE WITH CEREBRAL LOCALIZATION. *Il Nuovo Ercolani.* Dr. Faville Frigino reports the following: a three year old army horse showed only manifestations of an over-worked organism and presented no signs of sickness. After a few days of observation he became very excited, uneasy, pushing his head against the objects before him. Once he fell down, and was bled and had cold applications to the head. These relieved him some, but the period of excitement was succeeded by one of quietness; he was almost comatose for several days. His condition then improved. This was followed by an abundant discharge from both nostrils which was treated with subcutaneous injections of anti-streptococcic serum. Soon, however, another abscess came in the right parotid region and again another on the left maxillary. Finally one morning the horse was found down, unable to rise, with a pulse of 44, respiration 16 and rectal temperature of 38.2°. Paralysis was manifest and death soon occurred. At post-mortem, a cerebral mass was found injected, and under the left hemisphere there was a collection of pus contained in a pouch as big as a nut. The cerebral tissue was in normal condition. LIAUTARD.

AN EXPERIMENT IN HORSE PSYCHOLOGY. Vittorio Ricciarelli. An abstract from the Italian Journal "*Rivista di Psicologia*", Bollogna, 1914, No. 2.—Dr. Vittoria Ricciarelli, an Italian municipal

veterinarian, has been making an interesting experiment in horse psychology. He selected for his subject a colt of four months, not yet weaned, and began giving it systematic training. After twenty lessons of about twenty-five minutes each, the colt had learned to give a greeting by bowing its head; to extend, at its masters request, its right fore-hoof or its left hind-hoof; to distinguish by one, two or three strokes of its hoof, its fodder, its oats and its sugar; and to count up to ten by the same system. After the twentieth lesson the doctor taught it in six exercises to read the numerals from one to ten, which theretofore it knew by name only. The method of teaching was graded from the simple to the complex; and results were brought about through gentle and persevering means. There was no assistant at the experiments, and the colt was held by the bridle. When it had given an answer, it would try to free itself to go to eat oats; or it would come to smell the doctor's pockets in search of sugar; the hoped-for reward would, however, be withheld if the response was inaccurate, until an answer satisfactory to the master had been given.

Ricciarelli has been working on these experiments to this end—to try to discover if the cerebral activity of the horse is or is not susceptible of modification or development in the different stages of the animal's existence. It seems to him that, when we have demonstrated the existence or non-existence of this susceptibility, we shall have shown whether or not the equine psyche is analogous to that of the human being. That which distinguishes psychical activity from physical activity in the human species, is that, while the former is capable of essential metamorphoses, the latter is not. We find nothing in common between the psyche of the normal adult and that of primitive peoples, or that of the child who stammers automatically words of whose meaning he is ignorant; on the other hand, we have in common with both primitive races and with children, our manner of walking, of eating and of fulfilling all those physical functions, more or less unconscious and automatic, which have always remained the same in the human race.

Up to this time it has been supposed that the equine psyche, as also that of the other animals, bears the nature of a physical activity, since it has seemed—although it has never been proven—that the psyche of the oldest animals is exactly like that of the very young. If it could be clearly demonstrated, for example, that a young colt is capable of learning with equal facility what an adult

horse can and, vice versa, that an adult animal is not capable of more achievement than it was capable of in the early days of its life, the doctor would be willing to grant that the equine psychical phenomena are purely physical in nature. But if, as he is striving to prove, the contrary can be shown, we must admit that the phenomena observed are the manifestation of distinct intellectual possibilities, although of a grade far inferior to that of the human species. Such phenomena must become evident as the result of an artificial system of training, such as Ricciarelli is employing with his colt; this method may succeed in developing that energy which no evolutionary theory denies exists, at least in a latent state, in the higher animals. He purposes, therefore, to continue with his experiments on the colt up to the time when it shall have attained maturity at three and a half years, at which age its physical and psychical development may be judged to be complete. Then the doctor intends to mate him with a mare which has already been subjected, if possible, to the same training,—with the object of breeding, according to the laws of heredity, a race in which these phenomena have become heightened and accentuated. In this way he will be in a position to continue his experiments and collect a set of valuable data which may result in revolutionizing our preconceived notions of animal psychology. K. F. MEYER.

CENUROSIS IN A GAZELLE. Major Veterinarian Velu. *Revue Générale.*—A small gazelle was reported to the writer as having for a month past, a swelling on the right shoulder, causing lameness. The animal was examined and it was found that she was not actually lame, had no swelling on the shoulder, but a marked deviation of the neck which was turned toward the left. Careful consideration of the case and appearances indicated that she had cenurosis. A surgical interference was indicated but because of military service, could not be performed for some time. In the meantime the disease had progressed, an epileptiform crisis had occurred and there was between the base of the horns a small tumor, as big as a pigeon's egg, soft and easily reducible by pressure. It was the parasite cenurus, which after promoting the atrophy and then the resorption of the cranial wall, protruded under the skin.

While the animal was secured for operation, the right eye seemed slightly bulging from the orbit and was covered by an edematous swelling of the upper eye-lid. There was probably a

perforation of the cranium connecting with the orbit. The cenurus was extracted and measured a space 40 cubic centimeters. The animal died during the night from cerebral hemorrhage. The parasite had pressed upon the whole right cerebral hemisphere and the anterior part of the left. In the surrounding region the bony tissue had been the seat of extensive resorption. It was spongy, perforated by many holes, two of them, the largest, had opened into the bottom of the orbit. LIAUTARD.

OBSERVATION OF A CASE OF PULMONARY TUBERCULOSIS IN A CANADIAN HORSE. Bringard. *Recueil de Medécine Vétérinaire,* Vol. 92, pp. 213-215, 1916.—Horse 1920, 12 years, (named Dijonnais), arrived April 10, 1915, after a voyage which had greatly debilitated him. Entered the infirmary May 29, with strangles pneumonia (pneumonie gourmeuse), condition grave because the subject would not respond to treatment. There were numerous improvements and relapses.

Local irritants, tonics, febrifuges and diuretics postponed a fatal termination of the acute crisis, but the horse never completely recovered from his primary affection. He presented all the symptoms which are designated by old veterinarians under the name of "old founder" (vielle courbature) that is, a chronic affection of the lungs and pleura causing emaciation and general debility. The animal had regained appetite, but was in a state of continued fever, and manifested unmistakable signs of chronic bronchopneumonia, by accelerated respiration, fitful, weak and painful cough; marked weakening of the respiratory murmur, with bronchial and sibilant rales; diminished thoracic resonance and accentuated signs of dyspnea. The slightest exertion would wind the horse and rendered him useless.

There was progressive enfeeblement; skin dry and adherent to the ribs; mucous membranes became pale and edema appeared under the belly and inferior parts of the four limbs. Some time before death, urine became abundant; there was the polyuria that is ordinarily observed at the end of tuberculosis. Finally the subject succumbed in a state of complete physiological misery.

Since several cases of glanders were found in the lot of Canadians from which he came, we thought it possible that he was affected with that disease, and although there were no clinical symptoms apparent, the horse was malleinized three times, a month

apart. We used the intradermo-palpebral method, because the feverish condition prevented the use of the subcutaneous injection. All the tests were negative.

Autopsy.—The cadaver was in a state of very pronounced physiological misery. Traces of chronic founder on all four feet; the projecting parts of his body had been excoriated by prolonged decubitus. No nasal discharge, no traces of ulcers on the nasal septum. On skinning the subject we found the subcutaneous cellular tissue highly infiltrated and the muscles strongly emaciated.

Opening the thoracic cavity disclosed traces of an old pleuritis on the costal and pulmonary pleurae; in both lungs there were numerous chronic induration centers resulting from incompletely healed lobular pneumonia. This induration was particularly extensive in the anterior lobes; there was a multitude of tubercles, which were gray, homogeneous, without caseation centers or purulent disintegration. The mass of tubercles had the macroscopic appearance of the tubercles in bovine tuberculosis. On incising the large bronchial ganglia, there were numerous grayish yellow granulations, but no pus foci. Nothing significant in the other organs.

Inoculation tests on guinea pigs and bacteriological examinations excluded the bacillus of glanders BERG.

A CASE OF ANTHRAX. G. G. Reinle and R. A. Archibald. *The Journal of Infectious Diseases,* Vol. 19, No. 5, Nov., 1916.—Dr. L. A. Covel, a veterinarian, examined a cow that had died from anthrax. He developed the disease and 5 pustules appeared on his arm. Excision, which most authorities believe to be the best method of treatment, was not resorted to. Anti-anthrax serum appears to have played an important part in bringing about recovery. The lesions took on the characteristics of malignant pustules. They became less progressive after the first dose of serum. The fifth pustule appearing on the first day of treatment was arrested immediately. The patient's temperature curve reached a maximum of 103°F. 36 hours after dosage with the serum began and decrease as immunity and convalescence were established. Temperature was normal in about the 84th hour. Neither the anthrax bacillus nor any other infection showed in smears and cultures taken from secretions underneath the crusts on the 7th day after the serum treatment was begun. An eosinophilia ap-

peared with improvement in the patient's condition. The eosinophilia and its course through convalescence is unexplained. However, it is deemed worthy of special mention. HAYDEN.

HEMORRHAGE FROM THE SPLEEN. Capt. W. E. Armstrong, A.V.C. *Veterinary News.*—Two cases are reported by the author. In one, death took place after no precise symptoms. On post mortem, the spleen was noticed larger than normal and covered with numerous swellings of various size. Two were as big as a man's fist. The capsule of the spleen was ruptured at the base of the organ and blood escaped in the abdomen.

In the second case, there had been slight abdominal pains, temperature 102°F. Pulse 80 and weak, respiration jerky. Visible mucous membranes darker than normal. Pupils dilated. Abdomen very rigid. Expression anxious. Auscultation revealed slight peristalsis, percussion over the last four ribs caused pain. Rectal examination negative. As the case developed the symptoms were more marked; the legs were kept apart, ears and extremities grew cold, death after two hours of sickness. The spleen was found enlarged, and the capsule ruptured in two places at the base of the organ. The other organs were healthy.

LIAUTARD.

THE ACTION OF DIGITALIS IN PNEUMONIA. Alfred E. Cohn, M.D., and Ross A. Jamieson, M.D. (From the Hosp. of the Rockefeller Institute for Medical Research.) Abst. from *Jour. of Exp. Med.*, Vol. XXV, No. 1, Jan. 1, 1917, p. 65, 79, 80.—Digitalis has been used for many years in the treatment of pneumonia but there is still discussion as to whether its use is advantageous. A decision has been difficult because the difference between action as such and beneficial action has not been sharply drawn. We show in this paper that action on the heart by digitalis takes place in pneumonia, and also that its action under certain circumstances is beneficial.

SUMMARY: We have shown in a series of 105 cases of pneumonia, 95 of which we have selected as available for statistical study, that digitalis given by mouth has an action on the heart. We have judged this action to be present because changes occurred in the auriculo-ventricular conduction time and in the form of the T wave of the electro-cardiogram, just as they do in the non-feb-

rile heart. This conclusion is strengthened by finding that the pulse rate in fibrillating and fluttering cases fell in the presence of fever, exactly as it does in non-febrile cases. The dose and the time required to produce these effects are given and are the same as in the non-febrile cases. When there was a difference in the amount necessary to produce one or the other of the changes, it was found that the T wave is more often and more readily affected than the conduction interval. We have shown that the intoxication due to pneumonia is probably not responsible for the changes found, both from a study of the statistics and because in the control cases reverse tendencies were often found (that is, decrease in conduction time and increase in the size of the T wave). We have shown that the method of selection in consequence of which we treated a large number of severe cases did not prejudice our results, because it could be demonstrated that the proximity of death, whether in control or treated cases, was not necessarily associated with the changes we are describing. We have also, by referring to the literature of the subject, brought evidence to show that heart muscle does not undergo those changes in pneumonia, as it does in other infectious diseases, which would lead one to except changes in conduction found in other diseases. The changes in conduction which have been reported by others were almost entirely associated with the giving of digitalis.

CONCLUSIONS: 1. Digitalis acts during the febrile period of pneumonia.

2. It produces a beneficial, possibly a life-saving effect in cases of auricular irregularity (fibrillation and flutter).

3. Whatever beneficial action it has on the function of the normally beating non-febrile heart may be expected from its use in the febrile heart in pneumonia. REICHEL.

ANASARCA AND MALLEINATION. Major Veterinarian Bringard. *Bull. Soc. Cent.*—A Canadian mare having been brought to Breste in vessel where glanders had been reported was with several others malleined by the intradermo palpebral method. The next day she was reported as having given a typical reaction. In the injected eye, both eyelids were much swollen, there was an abundant discharge of purulent nature from the eye. The mare had also a yellowish bloody discharge from both nostrils. At first sight she was to be condemned, but on closer examination it was noted that on

the neck, and several parts of the body there were fluctuating tumors. There was also a rudimentary swelling of the lower extremity of the four legs and also around the lips and nostrils. The wings of the nose were thick and the septum nasi was covered with wounds which did not have the appearance of chancres of glanders. Some doubt was permissible as to the case being one of glanders or of anasarca. The mare was put under observation and received antistreptococcic serum; the swelling of the extremities increased, then the head; the breathing became difficult and during the development of this condition, the symptoms of the eye disappeared rapidly, and were all gone the following day. Nevertheless the mare was taken with colic and died. Post mortem: marked lesions of anasarca on the septum nasi, infiltration of subcutaneous tissue and of the muscles which were discolored. No lesions of glanders whatever. In the abdomen there was antemortem laceration of the great curvature of the stomach and obstruction of the small intestine due to a large invagination. There were no other lesions. LIAUTARD.

FRACTURE OF THE MANDIBLE OF THE INFERIOR MAXILLA. W. Cargill Patrick, F.R.C.V.S. *Veterinary News.*—Said to have worms, a three year old colt was brought to the writer who had no difficulty in finding that the trouble consisted in a fracture of the inferior maxilla across the body of the bone, behind the alveolar surface. On the lingual or superior surface of the same, a piece of bone projected upwards ¾ of an inch and prevented the animal from closing its mouth. One permanent and one temporary incisor were removed. The fracture extended through the primitive symphysis and the outer half of the body bore a separate fracture.

In order to attend the case, the colt was cast and in being chloroformed respiration ceased. After artificial respiration, drawing the tongue well forward, the animal came to and the operation resumed as follows: thorough cleansing of the parts, removing all loose bone and shreds of tissue, the separate fracture after being put into place, was drilled and sutured with wire, which afterwards, to give additional support, was twisted around the teeth. On the tenth day, the wire sutures were removed and recovery followed in due time. LIAUTARD.

On the Acetylene Gas Treatment in Ringworm, Sarcoptic Symbiotic, and Dermatodectic Manges. R. Stokoe. (*Vet. Rec.*, 28 (1915), No. 1433, pp. 279, 280). Abst. in *Exp. Sta. Record,* Vol. 35, No. 3, p. 279.—The author has found that powdered calcium carbid applied to the affected part (which has been moistened following a thorough scrubbing) and allowed to effervesce from a minute and a half, will destroy the ringworm parasite. Carbid can also be used with success in destroying mange parasites.

M. J. Harkness.

A Curious Case of Pericarditis in a Heifer. M. Larroque. *Recueil de Médécine Vétérinaire.*—A short history of an animal which appeared well one morning and was found dead a few hours later. She had never manifested the slightest ailment. It was supposed that she had died from water indigestion or from a kick from a horse near her. Neither supposition was proved correct at the post mortem, where extensive lesions were discovered.

In the abdomen; the digestive canal was normal, acute nephritis and perinephritis, liver cardiac, iliac lymph glands hypertrophied and hemorrhagic. In the thorax, on the right side was a yellow mass surrounding the heart, acute pleuritis lesions, lungs normal but lymph glands hemorrhagic. The heart showed advanced exudative pericarditis, myocardium greyish, it contained a small abscess full of grey-greenish pus. Several abscesses were observed in the way of formation. The whole myocardium was in a state of degeneration; the endocardium also. The valves were thickened and had granulations on their edges; there was quite a large hole in one of the mitrals. The sigmoids were also macerated on their edges.

Conclusions: Everything indicated that the pericarditis was due to a foreign body having traveled from the rumen, and yet nothing was found to affirm the supposition. Liautard.

—An annual meeting of veterinarians was held at Purdue University, Lafayette, Ind., February 27. Among those on the program were C. G. Starr, R. A. Whiting, M. H. Reynolds of Minnesota; W. E. Stone, President of Purdue; Ward Giltner of Michigan; and W. B. Craig of the Indiana Veterinary College.

ASSOCIATION MEETINGS

AMERICAN VETERINARY MEDICAL ASSOCIATION

REPORT OF THE COMMITTEE ON DISEASES NONSPECIFIC TREATMENT OF INFECTIOUS DISEASES IN ANIMALS

K. F. MEYER

The treatment of infectious diseases with biologic products has, until recently, been guided by the well founded conception of an antigen-antibody reaction and by the current ideas of specificity. It has been only within the last two years that attention has been repeatedly called by clinicians to some facts which cannot be explained on this basis. Particularly the bacteriotherapy of typhoid fever in man strongly suggests that numerous unknown and nonspecific factors are responsible for some of the splendid abortive cures of this disease produced by the use of various kinds of vaccines. The importance of some of these observations for the further development of a successful treatment of some of the infectious diseases of animals is already quite apparent, and inasmuch as the writer had an opportunity to study, during the past year, some phases of the mechanism of this new field of immunology, a brief report in form of suggestions is herewith submitted to the Committee on Diseases.

The history of the nonspecific treatment of infectious disease: Aside from the well known results of vaccine therapy in subacute and chronic local infections of a character due to the micrococci, the chief field in which vaccine treatment has been very encouraging is to be found in the bacteriotherapy of typhoid fever in man.

During recent years various kinds of vaccines have been elaborated. The attempted goal of this etiologic treatment of acute infectious diseases has been to shorten the morbid process with its symptoms, to free the blood-stream from the causative organisms, to reduce the production of toxins, to prevent the formation of pathologic changes in the organs, or to heal those already produced; but these vaccines used subcutaneously have not, for the most part, given good results.

The slow action of vaccines by subcutaneous or intramuscular application or the frequent absence of curative effects lead to the

direct introduction of the bacterial antigens into the blood stream. A number of Argentine physicians (Penna, Torres, Dessy, Grapioli and Fossate[1]) reported striking pictures of complete abortion of typhoid fever in man following the intravenous injection of killed typhoid organisms or extracts of the same. The introduction of such vaccine preparations called forth, in a number of cases, hyperpyrexia prescribed by chills, cyanosis, collapse and respiratory distress, which was followed in a few hours by a critical fall of the febrile temperature curve to a normal level. The drop in temperature may be accompanied by profuse sweating and marked amelioration of the symptoms. In normal persons the intravenous injection of typhoid vaccine may give a reaction like that in typhoid fever, but ordinarily larger doses are required.

These observations have since been confirmed and have been in numerous directions enhanced. Gay and his co-workers[2], for example, have found that the temperature reaction is always followed by a more or less marked hyperleucocytosis, and Jobling and Petersen [3] noted a more or less marked mobilization of the serum ferments (protease and lipase) which, in their opinion combats the intoxication which may result from the liberation of toxic protein split products in the diseased organism. Other writers have suggested that, following the shock the organism passes into a condition of anti-anaphylaxis in which it ceases to react to the disease producing organism or its products.

The intravenous therapy attained a different aspect, however, when Kraus and Mazza[4] reported that colon-vaccine gave identical results, while typhoid vaccine was of a marked benefit in certain cases of pelvic infection. Furthermore, Jchikawa[5] and Gay[2] found, later, that paratyphoid patients recovered when treated with typhoid vaccine. The specificity of the treatment was made more questionable when Lüdke[6] attained favorable results by the simple use of a non-bacterial protein split product—a deutero-albumose, or, as Jobling[7] quite recently was able to show by the injection of secondary proteoses. Aside from these split products, observations

(1) See Kraus: Wien. Klin, Wehnschr. 1915, XXVIII, 29.
(2) Arch. Int. Med., 1916, XVII, 303.
(3) Jour. Exper. Med. 1915, XXII, 568, and Jour. A. M. A. 1915, LXV, 515.
(4) Deutsch. Med. Wehnschr., 1914, XL, 1556.
(5) Ztschr. f. Immunitatsforsch., 1914, XXIII, 32.
(6) Munch. Med. Wehnschr., 1915, XXVIII, 321.
(7) Jour. A. M. A., 1916, LXVI, 1753.

are recorded on the effect of salt solution, distilled water, homologous and heterologous sera, ferments, leucocytic extract, colloidal gold, etc., in the treatment of enteric fever. It seems probable that a number of substances when introduced intravenously are capable of causing a reaction of the tissues and that this reaction, in the majority of cases, is responsible for changes which lead to a recovery from the infection.

These early observations have in many cases been verified and confirmed. On a clinical basis the following facts are well founded: In about forty per cent. (40%) of the cases the recovery is abortive and a normal temperature is established in a few hours to a few days; in about twenty-five per cent. (25 %) a lysis with shortened course of the disease occurs. And only in thirty-four per cent. (34 %) does no reaction result, the course of the infection remaining uninfluenced. The mortality of the treated cases is reduced. Complications are rare and the chances for relapses are remarkably diminished. Acute as well as advanced cases are favorably influenced by the intravenous bacteriotherapy, and only severely complicated cases—particularly those with affections of the circulatory or respiratory systems should be excluded from the treatment.

Various workers have presented different views concerning the dangers of this form of therapy and, in the main, no one point of view may be regarded as conclusive. Doubtless the intravenous administration of vaccines is an heroic treatment and, according to many writers, is not justified in every instance. Until we know more about the nature of the shock the body has to sustain under this treatment, it is imperative that necessary care and proper judgment be exercised. And we are far from heralding the intravenous bacteriotherapy as the ultimate goal of the modern treatment of infectious diseases.

In other infections also, nonspecific products introduced intravenously may cause acute critical reactions, as colon vaccine in puerperal-sepsis, typhoid vaccines in pneumonia (Mathers and Wells: see Hektoen[8]), proteoses and typhoid vaccine in acute, subacute and chronic arthritic infections (Miller and Lusk[9]).

The nonspecific treatment of animal diseases: Thus far only one report by P. von Szily and T. von Bessko[10] on the bacterio-

(8) Jour. A. M. A., 1916, LXVI, 1591.
(9) Jour. A. M. A., 1916, LXVI, 1756.
(10) Berl. tierärzt. Wchnschr., 1915, XXI, 517.

therapy of contagious pleuro-pneumonia of horses indicates that the observations made with the nonspecific treatment of acute infectious diseases in human medicine can successfully be applied also to veterinary medicine. The two writers used ordinary typhoid or cholera vaccine in doses of 5–10 ccm., each ccm. containing 500 million organisms. In the fifteen cases reported, the intravenous injection of these vaccines caused most remarkable results. The temperature fell in every case, either critically or by lysis, and a marked improvement of the clinical symptoms followed. In every respect the observations resembled those made in typhoid fever. The findings of Szily and Bessko can only be the result of a nonspecific reaction because the specific etiologic agent of contagious pleuro-pneumonia of horses is as yet unknown and only human pathogenic microorganisms were used for the injections. So far, no confirmation of these splendid results has been made, but they clearly show that there is some experimental justification for the use of intravenous bacteriotherapy in other animal diseases.

In reviewing the present literature we find among the reports on the specific treatment of animal diseases the statement that informally better results are obtained when the homologous or heterologous sera are used intravenously: thus the treatment of anthrax and symptomatic anthrax with horse serum (Jaeger, Detre, Leclainche and Vallee and others). In the light of the recent advances these observations find additional explanation, and the use of colloidal metals like "collargol" in morbus maculosus and similar septicemias seems to have some justification.

The reports of successful cures of distemper with horse serum or nuclein, rinderpest with bile and contagious pleuro-pneumonia of horses with salvarsan intravenously, are all examples which never were explained and which were, therefore, soon discredited; but now we know that the beneficial effect may be the result of a reaction caused by the introduction of nonspecific substances into the blood stream. Fischer has shown definitely that salvarsan is only active on intravenous injection and that the chills and fever that occur for 3 to 9 hours are necessary to produce the desired effect. Other examples which point towards the existence of nonspecific treatment of animal diseases could be easily enumerated. Veterinary medicine offers splendid opportunities for experimentation in hog cholera, mastitides, puerperal septicemia, distemper of

dogs, shipping fever of horses, and so forth. With the exception of pregnant animals, the dangers are very slight and can easily be avoided because circulatory complications are less frequent and the selection of the proper dose is not as important as in man. These and other considerations prompted us to make use of the nonspecific treatment of a disease of dogs simulating distemper.

During the last year our experimental kennels were frequently infected with this malady and the extensive number of cases of this disease interfered considerably with the progress of the experimental work. Prophylactic immunization with dead and living vaccines of the *B. bronchisepticus* (the bacillus has, until recently been regularly isolated from the respiratory tract of the infected dogs) assisted only temporarily in combating the epidemic. Inasmuch as the question of the etiology of distemper and allied diseases of dogs is still unsettled, and inasmuch as we were not in a position to conduct carefully controlled experiments to determine the cause of this disease which clinically resembles distemper, we were forced to find a means by which we could shorten the course of the infection and reduce its mortality to a minimum.

The observation of v. Szily and Bessko suggested the use of the intravenous bacteriotherapy with typhoid or *B. bronchisepticus* vaccines. We have experimented with such products on more than twenty-five (25) dogs and have noted in a large percentage of cases very promising results. Some dogs were studied very carefully, and to illustrate the reactions, the subsequent amelioration of symptoms and the recovery, a few cases are presented in detail:

Dog 71: Fox terrier, male. Developed on December 7th, 1915, a slight nasal discharge, coughed frequently and showed a slight conjunctivitis. In the next eight days his appetite was very capricious, and on December 15th the animal refused to eat. For several days the stools were loose and sometimes mixed with traces of blood. The temperature fluctuated between 102.0° and 103.0°F. The pulse was accelerated, but strong. No consolidations could be found on auscultation. The blood count showed a marked polymorphonuclear leucocytosis. On December 10th, 1915, the animal was treated intravenously with 1 c.c. Army vaccine containing 500 million typhoid bacilli. The temperature and leucocytic reaction are shown in Table I. On December 20th the temperature had fallen to the normal level, the improvement was clinically well

marked. In less than ten days after the treatment, the recovery of the dog was complete.

Dog 76, which served as a control, showed the same clinical symptoms and temperature curve, emaciated rapidly and had to be sacrificed on January 5th in a moribund condition.

Dog 79: Yellow and white female cur. Showed on December 1st all the signs of acute distemper. With the exception of a very annoying cough the animal showed slight inappetence and a moderate fever.

On December 2nd the dog was injected intravenously with 1 c.c. of *B. bronchisepticus* vaccine (killed at 60 degrees, C.) containing 200 million organisms per c.c., the temperature and leucocytic reaction are shown in Table II. The recovery was very slow, but on December 5th the animal had reached a low temperature level; the general behavior and appetite were much improved, but the cough persisted for several weeks and only on December 29th was a complete recovery recorded.

Dog 83: This animal developed "distemper" about the same time and therefore served as a control. It died on December 22nd with lesions of extensive pneumonia and gastro-enteritis.

Dog 89: A small, black, male cur: on December 28th had all the clinical symptoms of "distemper", was, therefore, treated with *B. bronchisepticus* vaccine. The temperature and leucocytic response were very slight, there was a slight amelioration of the symptoms but the dog died twenty (20) days after the intravenous treatment with all the lesions of a bilateral bronchopneumonia and its complications.

Dog 91: Small, black mongrel, received in a very sick condition; subnormal temperature; profuse purulent nasal discharge; leucocyte count of 14,850. Was immediately treated, December 8th, 1915, with 1 c.c. of Army vaccine; there was a slight leucocytic response (32,200) and temperature excursion, but no amelioration of the symptoms. The dog died 30 days afterwards with the lesions of bronchopneumonia.

Dog 225: Small, yellow and white fox terrier, female. Suffered for about a week from a severe purulent rhinitis, diarrhea with large amount of blood, emaciation, and inappetence. Two days previous to the injection with vaccine, a bilateral parenchymatous keratitis developed. The temperature ran between 39.2° and 40.5°, the leucocytic count was 16,800. Pulse and respiration

were accelerated but no definite consolidation could be determined. Following the injection of 160 million typhoid organisms, a most striking improvement in the clinical symptoms became manifest. The temperature, after a critical rise, fell below normal, rose in the next 48 hours slightly, but remained on a normal level after another injection of 160 million organisms. The stools became solid in 56 hours and no blood could be detected. The animal ate heavily 24 hours after the first injection and continued to have a very good appetite. The general behaviour was changed, the animal was active and attentive; the keratitis cleared up in 48 hours. Recovery was manifest in about three days after the last injection.

Two normal dogs were injected with Army and *B. bronchisepticus* vaccine, respectively. The immediate effects were similar to those seen in the sick dogs: in one or two hours a rise in temperature which reached its height within three hours of injection. This elevation of temperature was accompanied by a leukopenia which was followed in 18 to 24 hours by a marked hyperleucocytosis. In both cases the animal vomited between the second and third hours after the injection. The reactions were very severe in both dogs, but were not followed by any ill effects. In some recent observations three other dogs injected with peptone solutions and vaccines, the reaction apparently favored the development of a rhinitis with loss of appetite. We are at present unable to explain this observation and are, therefore, contemplating a careful study of these conditions.

Discussion of the nonspecific treatment in dogs: The injection of heated, killed vaccines of the typhoid or bronchisepticus bacillus causes in sick and normal dogs a train of symptoms which is very characteristic and apparently due to the operation of the same forces which give rise to symptoms following similar treatment of man injected with the typhoid bacillus and of horses suffering from pleuropneumonia. In a large percentage of the sick dogs this reaction was followed by a striking improvement of the symptoms and by critical or lytic recovery. The results depend considerably on the dosage of the vaccines which provoke a severe reaction which is characterized by a temperature excursion, hyperleucocytosis and mobilization of ferments. No definite method of procedure can be described in treating a given case of "distemper": in some cases one injection will be sufficient to restore a dog to an essentially normal condition as judged from the clinical symptoms

and temperature chart. In other instances it is necessary to repeat the treatment 3 to 4 days later, particularly when the temperature fails to remain normal. The size of the dose and the frequency of injections must depend upon the symptoms following the first injection. In about 25% of our cases the intravenous treatment was absolutely without effect. Most of these cases failed to show a marked leucocytic response. The temperature was frequently influenced, but the morbid processes in the respiratory tract apparently continued and, in such cases, repeated injections aside from producing temporary effects were never provocative of an abortive cure. Several of our experimental dogs could probably have been saved by several injections, but it was in the interest of our study to observe only the immediate benefit of one injection. In this connection it became evident that dogs with bronchopneumonic foci and high leucocytosis are the least responsive, and in such instances the intravenous treatment only protracted the fatal outcome. In connection with some experiments on rabbits, we made the observation that severely intoxicated animals show a very slight change of serum proteins and a correspondingly slight increase in the immune substances of the blood. It appears that the profoundly intoxicated body is unable to respond by a marked reaction to the vaccines which are introduced intravenously.

In a few cases only did we consider it advisable to test the immune substances against the *B. bronchisepticus.* In most instances a decided increase of the agglutinines for the *B. bronchisepticus* was recorded even after the injection of typhoid-vaccine.

The observations are too few, however, to warrant any conclusions. We consider our attempts purely experimental studies, and it is hoped that a repetition of the intravenous treatment of dog distemper or allied conditions from the same viewpoints, be attempted.

CONCLUSIONS: The successful treatment of typhoid fever, arthritis, puerperal sepsis in man and contagious pleuropneumonia of horses by intravenous injection of nonspecific bacterial vaccines suggested the treatment of distemper or allied diseases in dogs. Some very encouraging results by treating dogs with typhoid or *B. bronchisepticus-vaccines* are described to encourage more elaborate studies along this new line of vaccine treatment.

It would be inappropriate to draw conclusions or to make recommendations before further carefully controlled observations have been made on some of the animal diseases for which this treatment is, perhaps, applicable.

TABLE I.

Dog 71 Date	Hour	Temperature	Leucocytes	Remarks
Dec. 16, 1915	10:00 A. M.	102.0°	24,900	
Dec. 16, 1915	10:10 A. M.	—	—	1 c.c. Army vaccine equals 500,000,000 typho
Dec. 16. 1915	12:50 P. M.	105.4°	—	bacilli intravenously.
Dec. 16, 1915	1:50 P. M.	106.3°	31,900	Very depressed, vomited, muscular tremors.
Dec. 16, 1915	4:00 P. M.	103.0°	35,600	
Dec. 16, 1915	5:50 P. M.	102.0°	—	
Dec. 17, 1915	10:00 A. M.	101.8°	29,600	
Dec. 17, 1915	4:00 P. M.	102.2°	—	
Dec. 18, 1915	6:00 P. M.	102.3°	—	
Dec. 20, 1915	6:00 P. M.	101.1°	22,300	
Dec. 25, 1915	—	101.3°	—	Dog has made complete recovery.

TABLE II.

Dog 79 Date	Hour	Temperature	Leucocytes	Remarks
Dec. 2, 1915	11:40 A. M.	102.4°	8,700	
Dec. 2. 1915	11:55 A. M.	—	—	200,000,000 *B. bronchisepticus* killed by 60°
Dec. 2, 1915	1:50 P. M.	105.5°	—	and suspended in saline intravenously.
Dec. 2, 1915	3:45 P. M.	107.0°	8,100	Vomited at 1 P. M.
Dec. 2, 1915	6:00 P. M.	105.2°	—	
Dec. 2. 1915	10:05 P. M.	103.2°	29,900	
Dec. 3, 1915	10:00 A. M.	102.3°	21,800	
Dec. 3, 1915	6:00 P. M.	102.1°	24,700	
Dec. 4, 1915	12:00 P. M.	102.6°	15,000	Still coughs.
Dec. 5, 1915	6:00 P. M.	101.6°	—	
Dec. 6, 1915	—	101.6_	—	
	—	102.2	—	
Dec. 20, 1915	—	101.3_	—	Coughs rarely. Has diarrheic stools.
	—	100.0	—	Eats well and is picking up in general appearan
Dec. 29, 1915	—	—	—	Dog has made complete recovery.

AMERICAN VETERINARY MEDICAL ASSOCIATION REPORT OF THE ACCOUNTANT TO THE FINANCE COMMITTEE*

Dr. E. L. Quitman,
Chairman Finance Committee,
American Veterinary Medical Association.
Dear Sir:—

We have audited the records of the Treasurer of your association for the period August 1, 1915 to August 7, 1916 and have compared the results with the Treasurer's printed report and with the records of the Secretary, with the following results:

*The report of the Finance Committee of which this was to be a part has apparently been lost. The Editor has been unable to locate it.

We find that the Treasurer has duly charged himself with all funds transferred by the former Treasurer, George R. White, as well as all funds remitted by the Secretary representing, except as below noted, all of the income of record of your association. All funds have been duly deposited in the bank and have been with drawn only on warrants issued by the Secretary and signed by the President of the association. The warrants were further supported by invoices or other adequate receipt and by the cancelled bank checks duly signed and endorsed.

The report of the Treasurer does not include the income nor many of the disbursements on account of the Journal, which are covered by the separate report of the Editor of the Journal. The transfer of certain funds by the treasurer to the latter to meet the current expenses of the Journal do not, however, enter into the Treasurer's report.

The former Secretary, Dr. Mayo, paid direct to Miss Bertha C. Spencer, on August 20, 1915, the amount of $200.00 which funds did not pass through the hands of the Treasurer. The payment is adequately vouched, however, in a later Treasurer's Warrant covering the balance of the account for professional services rendered.

With these exceptions all income reached the Treasurer in full, and, as stated, is properly accounted for. The following warrants have not been returned to the Treasurer's files and consequently were not presented for audit. The Secretary's records, however, show that the warrants were duly issued and there is other satisfactory evidence of the validity of the disbursements.

WARRANTS MISSING

Warrant No.	Check No.	Check Paid to	Amount
40	47	Dr. W. H. Lynch	$ 8.00
44	51	Dr. E. H. Yunker	10.00
46	53	D. H. Hobos	8.00
47	54	A. A. Cuthberton	8.00
48	55	Jay McDonald	8.00
55	62	Joseph Mosher	8.00
62	69	Dr. S. H. Ward	82.32
89	96	Dr. S. W. Allen	35.00
94	101	G. A. H. Edmiston	3.00
102	109	Dr. U. H. Stewart	4.00
103	110	Dr. Daniel J. Meador	3.00
104	111	Dr. F. R. Wadsworth	3.00
109	116	Dr. C. D. Turney	3.00
112	119	Dr. H. K. Moore	2.00
113	120	Am. Vet. Review for Dr. R. W. Ellis	500.00

WARRANTS NOT RECEIPTED

19	26	Dr. A. Eichhorn	$ 18.62

Supplementing our certificate and the Treasurer's printed report, we present herewith a Summary of Cash Statement which shows in somewhat more condensed form the results of the year's financial operations.

We have been requested to prepare a statement of Financial Condition, including all assets and liabilities of the Association as of date August 7, 1916. Unfortunately, the books, both of the Secretary and of the Treasurer, are records of cash transactions only, and do not take into account the accrued but unpaid assets and liabilities, and our limited time does not permit of a thorough examination into these features. However, with the assistance of the Secretary, we have prepared a tentative statement, which, while not accurate, we trust will satisfy present needs.

HOLLIS, TILTON & PORTE,
By Frederick A. Tilton, C.P.A.

My Certificate dated July 26, 1910.
My Bond expires August 15, 1917.

RECEIPTS AND DISBURSEMENTS
AUGUST 1, 1915 TO AUGUST 7, 1916

RECEIPTS

1915		
August 30,		
Balance in bank as per report of Treasurer Geo. R. White		$ 1,192.27
August 1–19		
Receipts as listed in Secretary Nelson S. Mayo's Cash Book No. 1:		
Balance from July 1915	.25	
From Applications	448.00	
From dues	1,564.75	
From Fob Sales	8.50	
August 22–Sept. 28		
Receipts as listed in Secretary Mayo's Cash Book No 2.		
From Applications	112.00	
From dues	819.00	
From other sources	1.10	
Less checks charged by Bank, account not sufficient funds:		
Aug. 25—$8.00, Sept. 10—$8.00	16.00	2,937.60

September 28		
Excess pmt. by Dr. Mayo to Sec'y C. M. Haring Amount as above—$2,937.60, less $200.00 paid to Miss Spencer, $2,737.60. The amount paid over was $2,740.60		3.00
Sept. 12 to Aug. 7, 1916		
Receipts as listed in Secretary C. M. Haring's book and deposited in Berkeley Bank of Savings & Trust Company:		
From Applications and Dues	$7,410.00	
From other sources	2.85	
Less checks charged by Bank, account not sufficient funds:		
October 15—$3.00, Jan. 24—$3.00 and May 19—$10.00	16.00	7,396.85
1916		
Feb. 24		
Interest allowed by Tenth Nat. Bank, Philadelphia account deposits by Treasurer Frederick H. Schneider		4.59
August 2		
Frederick H. Schneider		8.67
TOTAL RECEIPTS		11,542.98

DISBURSEMENTS

August 30, 1915		
Paid by Dr. Mayo to Bertha Spencer on account reporting Oakland meeting	$ 200.00	
October 15, 1915 to August 2, 1916		
Payments made by Treasurer F. H. Schneider on approved warrants	8,762.37	
TOTAL DISBURSEMENTS		8,962.37
Balance		$ 2,580.61
This balance is made up of:		
Deposit in Tenth Nat. Bank, Philadelphia as certified to by Cashier of the Bank under date August 3, 1916	$1,349.06	
Remittance by Sec'y Haring to Treasurer Schneider Aug. 8 deposited by the latter in Bank Aug. 14 as per Bank Book entry	1,231.55	$ 2,580.61

CLASSIFICATION OF DISBURSEMENTS

An approximate analysis of the disbursements is as follows:

Expenses of Officers and Committees	$ 746.62
State Secretaries' Expenses	140.80
Printing, Stationery, Postage and Clerical	833.87
Secretary's Salary, Dr. Mayo $200.00; Dr. Haring $400.00	600.00
Expense Inspection Educational Institutions	436.33
Payments to apply on purchase of Review	2,000.00
Refund Dues, application fees and subscriptions	70.00
Expense, Legislative Committee	500.00
Flowers for Memorials	20.00
Officers Bonds	18.75
Copies of the Journal purchased	151.00
Expense account Journal	648.85
Revolving fund, Journal	1,300.00
Dr. Fish, Salary	1,000.00
Expense reporting and transcribing records of meetings	496.15
	$ 8,962.37

DELINQUENT AND CURRENT DUES

DELINQUENT

The outstanding dues are distributed, approximately, as follows: (Aug. 1, 1916)

42 Members owe $15.00 each	$ 630.00
47 Members owe $12.00 each	564.00
95 Members owe $ 9.00 each	855.00
80 Members owe $ 6.00 each	480.00
61 Members owe $ 3.00 each	183.00
TOTAL	$2,712.00

CURRENT

Membership per published list in Journal of July 1916:

2,061 at current rate $3.00	$6,183.00
Less paid at date	2,281.00
	$3,902.00

STATEMENT OF FINANCIAL CONDITION

August 7, 1916

ASSETS

Cash on Hand in Bank		$ 2,580.61
Dues Receivable 1911-1912	$ 126.00	
1912-1913	267.00	
1913-1914	552.00	
1914-1915	792.00	

1915-1916	975.00	
1916-1917	3,902.00	6,614.00
Investment—Journal A.V.M.A.		2,000.00
		$11,194.61

LIABILITIES

Expenses of Present Convention
Committee Appropriation
Salary Appropriations
Balance (if any) due on Journal
Deficit (if any) operating Journal
Sundry unpaid Bills
Reserve for uncollectible Dues
Surplus (Capital)

Dr. E. L. Quitman,
Chairman Finance Committee,

We have completed the checking of the accounts of the Editor of the Journal which were presented for audit and submit herewith summary statement of operations, together with Balance Sheet as at July 31, 1916.

So far as the income is recorded in the books, we are able to certify that all receipts of money are properly accounted for, but obviously in our limited time you will not expect us to certify to the completeness of the reported earnings which would involve the examination of the subscription lists, the sold space, rates, etc., data concerning which, in any event, is not at hand.

We have checked all disbursements with the receipts, bills or other vouchers and with the cancelled checks, and found, with a few minor exceptions, that all entries were properly supported.

In attempting to arrive at the financial condition of the Journal, we were confronted with the fact that the books show only the cash transactions and do not take into account the accrued but unpaid accounts whether receivable or payable. Further, in the absence of any definite information as to the number of members of the A.V.M.A. who are subscribers of record to the Journal and of any action as to what portion of the dues is applicable to this service, we have not assumed to show the amount which may be considered as earnings to be paid out of the General Fund.

Assuming the number of members of the A.V.M.A. receiving the Journal to be 1,726 the cost to the General Treasury per mem-

ber is found by dividing the apparent deficit for the period, $2,289.28 by that number, and is $1.33.

The books as kept do not conform to the approved methods of bookkeeping and, while in this instance all important facts concerning cash transactions were ascertained, we would urge the introduction of a proper system of double entry bookkeeping. In this we could undoubtedly be of further service to you or perhaps better an accountant could be found at the place of publication who could give it close attention.

HOLLIS, TILTON & PORTE,
By Frederick A. Tilton, C.P.A.

My Certificate dated July 26, 1910.
My Bond expires August 15, 1917.

AMERICAN VETERINARY MEDICAL ASSOCIATION
RECEIPTS AND DISBURSEMENTS INCIDENT TO THE PURCHASE AND PUBLICATION OF THE JOURNAL
FROM OCTOBER 1, 1915 TO AUGUST 1, 1916

RECEIPTS	EDITOR'S FUND	TREASURER'S FUND	TOTAL
Renewals and Subscriptions	$2,110.02		$2,110.02
Advertising	2,327.76		2,327.76
Miscellaneous	116.81		116.81
Sale of Binders	23.00		23.00
Treasurer A.V.M.A. Revolving Fund	1,300.00	1,300.00	
Unaccounted for	5.58		5.58
	$5,883.17	$1,300.00	$4,583.17
DISBURSEMENTS			
Printing Journal	$3,909.05	$ 454.55	$4,363.60
Postage Pound Rates	158.42		158.42
Postage Stamps	297.46		297.46
Office Clerical	308.70	37.20	345.90
Office Miscellaneous	36.35	44.90	81.25
Miscellaneous Journal	186.35	8.13	194.48
Refunds	41.63		41.63
Binders	14.95		14.95
Half Tones	91.80		91.80
Sundry Expenses	27.89	15.32	43.21
Expenses Committee on Journal		88.75	88.75
Copies of October 1915 Journal		151.00	151.00

Payments on Purchase of the Review		2,000.00	2,000.00
Salary Dr. P. A. Fish		1,000.00	1,000.00
	$5,072.60	$3,799.85	$8,872.45

EDITOR'S FUND

Receipts	$5,883.17
Disbursements	5,072.60
Balance in Bank July 31, 1916	$ 810.57

BALANCE SHEET OF THE JOURNAL JULY 31, 1916

ASSETS		
Good Will, Subscription List, etc.	$2,500.00	
Cash in Bank	810.57	
Accounts Receivable (if any)	?	$3,310.57
LIABILITIES		
Unpaid Bills (if any)	?	
Balance on Purchase of Review	$ 500.00	
Advances from Treasurer's Fund	5,099.85	5,599.85
*DEFICIT 10 months from October 1, 1915		$2,289.28

*To offset the seeming deficit, it should be taken into account that the Journal furnished the paid-up members of the A.V.M.A. with 1726 subscriptions, which according to the decision of the executive and Journal committees were to be paid for at the rate of $2.00 each, making a total of $3,452. This amount to be taken from the dues. As shown in the accountant's statement $2,000, or four-fifths of its purchase price, was also paid to the American Veterinary Review.

SECRETARY'S OFFICE

1827 South Wabash Avenue, Chicago, Illinois.

Dues of 1916.

As much as the executive officers would like to retain your influence as a member, the American Veterinary Medical Association, which is now a legally constituted corporation engaged, among other things, in the publication of a monthly journal, is forbidden by the United States authorities to carry on its roll members who are in arrears, unless such members signify in writing their intentions to pay their dues at some future time.

Will you not please, therefore, remit the dues of 1916, and thus relieve us of the very unpleasant duty of removing your name

from the membership list? This is not an appeal for pecuniary assistance as the association is on a sound financial footing. It is a plea for your moral support and an appeal to your patriotism.

Did you ever think what a worthless, slipshod non-entity the veterinary profession in America would be were it not for the inspiring influence of the A.V.M.A.?

Whether or not during your busy professional life you have ever given the matter a thought it must seem plain when your attention is called to it that the day is here when the veterinary profession must show a strong front, and since it is only through a big nation-wide organization that a strong front can be maintained, the loss of your support as a member is not a trivial matter. The nation needs this organization and the organization in turn needs you. We are to-day as a profession confronted with the necessity of showing our ability to promote, protect and conserve our greatest national resource—the live stock industry. If we fall short in this connection others, already in the field, will do it for us; we are at this very moment being consulted by our national officials about our qualifications as veterinarians, our willingness to serve our country in case of war and the number of available men we have; besides we are face to face with the problems of raising our standard of matriculation, of education and of ethics; all of which can only be accomplished by a solidly united profession, determined to improve its morale.

CONCESSION IN RATES TO THE ANNUAL MEETING

The Central Passenger Association which includes all of the railroads east of the Mississippi and north of the Potomac have made a concession of 2c per mile for our annual meeting at Kansas City, the selling dates being August 17th, 18th and 19th, and the return date has been set at August 29th. The Southeastern Passenger Association, which covers the same territory south of the Potomac, although at first refusing our request, has agreed to reconsider its action at a meeting of the representatives of the different railroads to be held at New Orleans, April 18th. I am sure from one of the letters last received from the secretary of this association that a favorable action may be expected, and that our southern members will not again be discriminated against in this connection. With the assistance of Dr. Burson, state secretary for Georgia, we have endeavored to show the railroad officials of this

section of the country that a help to the A.V.M.A. will in turn help them.

As regards the Pacific Coast we have been promised "BACK EAST" excursion dates for August 16th and 17th, although the official action in this connection will not be taken until sometime during April. If we should be successful in having these dates fixed, low rates will be assured from every part of the country.

CORRECTIONS

In the March issue of the *Journal*, through an error of ours, the name of W. Horace Hoskins was omitted as secretary-treasurer of the Salmon Memorial Committee; that of M. H. Reynolds as secretary of the International Commission on Bovine Tuberculosis; and that of M. P. Ravenel as a member of this commission. The Army Veterinary Service should replace the title of Army Organization.

L. A. MERILLAT.

NEW YORK CITY VETERINARY MEDICAL ASSOCIATION

OCTOBER MEETING. The first regular monthly meeting of this association following the summer recess was held October 11th, 1916. A clinical program was very successfully carried out during the afternoon at Berns Veterinary Hospital, 74 Adams Street, Brooklyn, N. Y. Dr. John Adams, professor of surgery at the University of Pennsylvania was present and took an active part in the surgical clinic. The following cases were presented for examination and operation. 1. Horse—Bone Tumor, size of fist on upper *maxillary* bone, just above incisor teeth, pushing upper lip up out of shape—presented by Dr. E. Hanshew as an interesting condition. Two incisor teeth missing and they may be the nucleus of this growth.

2. Horse—Healed quittor, six months after operation—presented for examination by the Berns Veterinary Hospital.

3. Horse—Quittor. Two weeks after operation—presented by the Berns Veterinary Hospital for examination.

4. Horse—Quittor—inside of off hind foot complicated with quarter crack. Presented by Dr. E. B. Ackerman, operated by Dr. R. W. Gannett, assisted by Dr. Schuppan. The Bayer method as described by Dr. W. L. Williams was modified, in that the anterior portion of the V-shaped incision was continued in the laminae

up to but not through the scar tissue filling the fissure in the coronary band at the seat of the quarter crack. The entire lateral cartilage was removed. It showed extensive necrosis. To prevent a recurrence of quarter crack the isolated portion of the coronary band, posterior to the above mentioned fissure, was excised. The horse walked home directly after the operation.

5. Horse—Lame, forward-hitting on heel like old founder case—looked as if he might have dropped sole and seedy toe but this was not the case. Presented for diagnosis, probably a keraphyllocele caused by calk wound. Presented by the Berns Veterinary Hospital.

6. Horse—Paraphymosis—presented for operation by Adams Method. Had improved so much under treatment that operation at this time was considered unnecessary.

7. Femoral Paralysis and Atrophy following an attack of Azoturia. Seven months standing.

8. Another of the same of one months duration—both of these cases are improving but not much difference in the two for the length of time after the disease and shows how slow the improvement is for the first few months and how rapidly recovery takes place after they pass a certain stage. The first case was treated by injecting rectified turpentine in tissue but found to be of little value. These cases were also presented by the Berns Veterinary Hospital.

9. Horse—Very large forearm involving elbow joint. Bony, opened—discharge of bloody serum. Probably osteo sarcoma. Prognosis: very unfavorable, recommended destruction. Presented by Berns Veterinary Hospital for diagnosis.

10. Horse—Granulomata of Eyeball. Growth from sclerotic coat of eye. Probably involves inner coats. Had been removed but returned. Very likely of a cancerous nature. Removal of entire eyeball will be the only cure. Presented by Dr. R. W. Ellis for diagnosis and operation.

11. Pony—Brought from New York in Ford Touring Car. Slough of the right hind hoof, whole hoof coming off, no cure; destruction recommended—destroyed. Post-mortem showed fracture of the os-pedis. Presented by Dr. L. Griessman for diagnosis and operation.

12. Horse—Fistula of withers. After operation—presented by Dr. Magee.

13. Horse Lame—Right front foot. For diagnosis. Navicular disease or low ring bone. Concensus of opinion was the latter. Presented by Dr. Stark for diagnosis.

14. Horse—Suspected roarer—presented by Dr. Ackerman for diagnosis and operation if necessary. Exercise proved him to be a roarer and Prof. John Adams operated.

15. Horse—Cold abscess—presented by Dr. Ackerman. Not operated on for lack of time.

16. Bull dog. Hodgkin's Disease, pseudo leukemia, progressive hyperplasia lymphatic glands, associated with anemia.

17. Bitch. Paralysis—for diagnosis and operation or whatever necessary. Diagnosis: Pus in the Fallopian tubes, diseased ovaries, etc. Diagnosis by Drs. Gill and Blair—operated on by Dr. Gill.

18. Puppy. Swallowed seven-inch hat-pin head first, came out through neck. Operated on by Dr. Gannett who opened the esophagus.

19. Head and viscera of a bullock showing lesions of generalized actinomycosis. These specimens were saved for the meeting by Drs. Danziger and Krocher, Veterinary Inspectors for New York City Health Department.

There were several other interesting cases left that were not examined or discussed for lack of time. The members and guests then adjourned to the Hotel Bossert where an excellent dinner was served and enjoyed by all. President Goubeaud opened the postprandial part of the program by introducing Dr. T. E. Smith as toastmaster. Dr. Smith, after a few well chosen remarks, introduced Dr. John Adams as the principal speaker of the evening who made an interesting and instructive address. The doctor gave some interesting experiences of his own career as a veterinarian and said, in part, that it is essential that a surgeon must be familiar with the general principles of anatomy and cultivate mechanical dexterity. Recommended the use of a few instruments. Also urged the veterinarians to be honest in all their dealings and thereby command the respect of their clients and the public as a whole. Dr. J. G. Wills, Chief Veterinarian, Department of Agriculture and President of the New York State Veterinary Medical Society also made a brief address and said that these gatherings of veterinarians are important not only for the exchange of views and discussion of interesting cases and conditions but, for the social spirit

engendered and the friendships made. Said that the membership of the State Society should be greatly enlarged as only about one-quarter of the legally registered veterinarians in the state are members.

Dr. Smith, before introducing the next speaker, spoke of the election of a delegate to the A.V.M.A. and Dr. Ellis, when called upon to speak, followed up Dr. Smith's remarks by suggesting that it would be well to decide on a representative veterinarian from this district.

Dr. H. D. Gill spoke of the experience gained in the years of his practice and said as years pass, one realizes the need of friends. Urged that we organize properly and work together. Dr. W. Reid Blair also made a few remarks. Dr. George H. Berns gave some interesting accounts of his practice in Brooklyn since 1879 when he first started to practice at the same address as the Berns Veterinary Hospital still occupies. Said at that time there were only one or two other qualified practitioners in the city. A rising vote of thanks was extended to Dr. Adams, Dr. Wills and the Berns Veterinary Hospital for their efforts in making this meeting one of the most successful ever held by this association. Fifty-six members and guests were present at the dinner. It was announced that the Massachusetts Veterinary Society would hold a large meeting on October 18th and as many as could do so were urged to attend. The president was empowered to appoint a committee. The program committee also announced that Dr. V. A. Moore of the New York State Veterinary College was expected to address this association at the November meeting.

NOVEMBER MEETING

The regular monthly meeting of this association was called to order by the president, Dr. Goubeaud, in the lecture room of the Carnegie Laboratory at 8:45 P. M.

Drs. Cochran and Gannett gave a brief report of the work and financial condition of the prosecuting committee. Gave a brief report of a recent case in which evidence had been obtained but owing to a technicality the judges dismissed the defendant.

Dr. Gill suggested that the veterinary law be referred to the State Educational Department and the Attorney General.

Dr. Gill then asked for a report regarding the complaint made against Dr. Kingston as employing a non-registered assistant.

Dr. Gannett stated that such complaint had been made to the commissioner and referred to Dr. Gill.

Dr. Kingston who was present stated that he is a member in good standing of this association, and employed a man to do nursing work under his personal direction. Also said that under the circumstances he felt that he should have been notified before any action was taken.

Dr. A. G. Hall of Earlville, N. Y. was then introduced and gave an interesting talk on "Some of the Common Diseases of Cattle." The doctor mentioned some of the common udder troubles met with in dairy cattle. Hoof rot was also mentioned and is treated with clear carbolic acid and alcohol is then applied. Iodin is also used. Highly recommends placing lime at the sill of the door where cattle enter the stable.

Pneumonia is treated along the same lines as in the horse. In uterine troubles such as inflammation of the uterus and slight cases of peritonitis inject two or three ounces of sulphuric ether.

In cases of retained placenta does not recommend the removal of the same. Oil of savin in two dram doses is administered night and morning. Iodoform in capsules is introduced into the uterus. Sulphuric ether is also used. Garget in its incipient stage is detected by the use of fine mesh screen on milking pail. Recommends dipping teats in mild antiseptic solution.

In cases of acute mammitis good results have been obtained by applying a bran sack stuffed with cotton and kept wet with hot water.

In the control of tuberculosis the doctor also recommends the use of the individual manger and drinking cup.

Dr. Way announced that Dr. G. A. Knapp of Millbrook, N. Y. had expected to be present and read a paper but had been unavoidably detained. However, Dr. Knapp had forwarded the manuscript and Dr. Way read his paper which was entitled "Experiences in the Control of Infectious Diseases in a Large Herd."

This was an excellent paper and dealt in detail, giving facts, dates and figures of his experiences in one of the largest herds in the state.

Dr. V. A. Moore, Dean of the New York State Veterinary College, then gave an excellent address on "Diagnosis, Control and Eradication of Infectious Diseases."

Dr. J. G. Wills was requested to open the discussion of the

papers and said, in part, that he had been in close touch with the work done by Dr. Knapp and thoroughly agrees with him that segregation is a necessity in the control of infectious and contagious diseases.

Individual mangers and drinking cups cannot but help to cut down the danger of infection. Also spoke very highly of Dr. Moore's paper.

Dr. Gill also stated that he was much pleased and interested to have listened to such excellent papers.

Among others who entered into the discussion were Drs. Berns, De Vine, Chase, and Blair.

The association tendered a vote of thanks to the contributors to the program of the evening and the secretary was, on motion, instructed to acknowledge Dr. Knapp's paper.

The program committee announced that at the December meeting a discussion of the cases operated on at the October meeting would be held. ROBERT S. MACKELLAR, Secretary.

THE NORTHEASTERN INDIANA VETERINARY ASSOCIATION

The regular meeting and annual clinic of the Northeastern Indiana Veterinary Association was held at Muncie, Indiana, February 13th.

The afternoon was given over to the clinic which was held at Dr. Boor's hospital. A number of operations and demonstrations were performed; among these, demonstrating the single rope method of raising an animal, by Dr. C. C. Dobson; radical operation for poll evil by Dr. Boyd and Dr. Hadley; operation on dog, by Dr. Leach; operation on a broken shoulder on a horse, by Dr. Boyd; ovariotomy, by Dr. Boyd.

After the clinic a fine dinner was served at the Delaware Hotel. The meeting was called to order in the same hotel by Dr. Stoker, president. The minutes of the last meeting were read and approved. A motion to revise the mailing list and by-laws was carried. A paper by Dr. F. A. Bolser read by Dr. Rogers on differential diagnosis of hog cholera, resulted in much interesting discussion, and many important points were brought out. Paper by Dr. Boor on proposed legislation was read and heartily endorsed by those present.

Applications received: Drs. C. C. Allen, Selma; Claud Weber, Oakville; C. C. Sheiler, Eaton; F. A. Moore, Gaston; J. C. Rodgers, Anderson; C. C. Dobson, Muncie, all of Indiana.

Motion to adjourn and the next meeting to be held at the Wayne Hotel, Ft. Wayne, Ind., March 13th.

R. H. Boyd, Secretary.

THE SAGINAW VALLEY VETERINARY MEDICAL ASSOCIATION

The registered graduate veterinarians of Saginaw and Bay Counties met at the West Side Business Men's Association rooms, Saginaw, Mich., March 1st, and the Saginaw Valley Veterinary Medical Association was formed.

It is the intention of the members to get the veterinarians of the surrounding counties to come into the fold and help make this a real association.

Dr. G. W. Dunphy, State Veterinarian and Dr. H. M. Newton, Federal Veterinarian in charge of hog cholera control in Michigan were the instigators of this meeting and were both present to assist in framing things up.

The association is formed for the purpose of advancing the interests of the profession generally and to promote a closer relationship among the valley veterinarians. It will co-operate with the County Agents and State Live Stock Sanitary Commission in the control of contagious diseases.

The officers elected were: President, Dr. William Brooks, Saginaw; Vice-President, Dr. G. W. Cronkite, Saginaw; Secretary-Treasurer, Dr. M. P. Hunt, Frankenmuth.

Board of Directors: Dr. H. D. Monroe of Pinconning for one year; Dr. George H. Carter of Saginaw for two years; and Dr. Ducey of Merrill for three years.

Executive Committee: Dr. J. H. Donald of Bay City; Dr. C. M. Culbert of Chesaning; and Dr. John Russell of Saginaw.

Another meeting of the association will be held in Saginaw in two weeks at which time by-laws will be adopted and a permanent organization perfected. M. P. Hunt, Secy.-Treas.

KEYSTONE VETERINARY MEDICAL ASSOCIATION

The regular monthly meeting of the Keystone Veterinary Medical Association was held on Tuesday evening, March 13th, 1917, at Philadelphia, Pa. Large attendance.

The program for the evening was as follows:

The Physical Examination of Dairy Cattle for Tuberculosis by Dr. Victor G. Kimball.

The Veterinarian and the Agriculturist by Dr. D. E. Hickman.

The Remedy Comes from Within by Dr. Charles H. Duncan of New York—Discoverer and Founder of Autotherapy.

These subjects were thoroughly discussed by several of the members. C. S. Rockwell, Secy.-Treas.

THE NORTHWESTERN OHIO VETERINARY MEDICAL ASSOCIATION

The meeting was called to order by President Hover. The minutes were read by Secretary Hershey and approved. The report of N. D. Backus as chairman of the auditing committee was accepted.

The following officers were elected: President, Dr. Harry Fulstow, Norwalk; Vice-President, Dr. W. E. Meyer, Fostoria; Secretary-Treasurer, Dr. C. E. Hershey, Tiffin.

After an interesting address by the president the following program was given:

Poisoning by Castor Oil Bean .... F. A. Young
Colic—Its Complications .... A. C. Schafstall
Removing Retained Placentae by injecting Placental Vessels
with Saline Solution .... R. R. Shaw
Some New Therapeutic Suggestions .... N. S. Mayo
Oophorectomy of Sows .... C. L. Jones

The paper on the Milk Supply of Small Towns which was to have been given by Dr. Sheets was not presented but the subject was discussed by Dr. Merillat.

The address of Dr. Adams of Philadelphia was devoted to the paralysis of the penis; quittor; poll evil and roaring. The papers brought out good discussions and much interest was manifested.

Nine new members were elected. At the suggestion of Dr. Gibson, it was voted that the next meeting be held at Detroit with the Michigan Association.

At the banquet an address was given by Dr. R. C. Longfellow of Toledo. After-dinner speeches were also made by Drs. Mayo, Adams, Merillat and Newton.

COMMUNICATIONS

"SERVICE"

Editor Journal of the American Veterinary Medical Association,
Ithaca, N. Y.:

After reading the editorial on "Service" in the March issue of the *Journal* of the Americal Veterinary Medical Association, I can not refrain from commenting on the same, especially since, in my opinion, a professional or scientific publication is not the proper channel for discussions as contained in that editorial.

No one can take exception to anyone showing favoritism in the Great War. It is the privilege of all to have feelings in the matter and even to express them. Furthermore, with the severance of the diplomatic relations and the possibility, or even probability, of our country going to war with Germany, every American should be impressed with the duty he owes to his country. It is likewise perfectly proper and patriotic to urge those who ought to be reminded of these obligations, and for a veterinary journal to stimulate the members of the profession to contribute their bit in one field or the other.

But these ought to be and should be the limitations of a professional or scientific journal.

The writer of the editorial in his introductory statement has amply expressed himself with regard to the turn of events and his subsequent discussions are entirely superfluous and uncalled for. It is gratifying that to date the professional and scientific publications of the neutral countries and even those of France, Austria and Germany, have properly abstained from any inferences as to the political and other conditions of the war, and confined themselves to the professional and scientific topics which developed in the course of events.

It would have been proper for the writer of the editorial to confine himself within such limits and abstain from definitions of patriots, traitors, etc. Such information we obtain from the daily press and from political magazines and as a matter of fact they are the proper medium for that sort of reading matter.

If the writer had started his article with the third paragraph on page 798 it would have been a very appropriate editorial for the critical times that are confronting us. But it is regrettable that he allowed himself to be swayed by his enthusiasm to the detriment and against all propriety of the official organ of the American Veterinary Medical Association. We are not yet at war! At least we were not at the time the editorial was written and we might some day regret that we published the editorial in question.

In conclusion permit me to state that in making this comment I have not been prompted by any pro-German sympathies. I am an American by choice and in need I am ready to offer my services to my adopted country.

March 7, 1917. Very truly yours,

A. EICHHORN.

[The writer of the editorial on Service, although of German descent, is an American before he is an editor. He believed, and still believes, the editorial dealt with *facts* and that it is not "regrettable" for any scientific or professional man to possess patriotism or to demonstrate it.]

POSITION IN COLOMBIA

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

The following is a copy of a cablegram left with me by the secretary of the Colombian Legation in this City:

"It is very urgent consulting Department of Agriculture if it would be possible to find an expert veterinarian with enough experience that may come to tropical climate as professor with residence there. Please wire terms and conditions of contract." (Signed) Minister of Agriculture of Colombia.

I was unable to suggest to that Government the name of a veterinarian to fill the position which they have. Whoever replies should have a knowledge of Spanish as that is the language of the country. Evidently it is the expectation of that country to establish a veterinary school. I would expect that this position would carry a salary of $5,000 in gold including transportation. As this information may be of some value to some of your readers, I am transmitting it in order that you may carry it in your next issue.

Very truly yours, A. D. MELVIN, Chief of Bureau.

ANOTHER "SIR KNIGHT" ADDED TO THE PROFESSION

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

In the recent list of honors conferred by King George, of Great Britain, is one of more than passing interest to the Veterinary Profession generally, and more particularly perhaps to those in this country who have been devoted to the upbuilding of our own Army Veterinary Service. The writer refers to that of K.C.M.G. (Knight Commander of the Order of St. Michael and St. George) conferred on Hon. Major-General Robert Pringle, Director-General of the British Army Veterinary Department. But while it is the latest, it is by no means the only, honor given him by his Sovereign for meritorious service rendered.

Sir Robert Pringle has had a distinguished career in the service of his country. He joined the British Army Veterinary Department in 1878, and later saw much service in India and elsewhere. In the Afghan War in 1879-80 he served with distinction and was awarded the medal. In the Wazeree Expedition of 1881 he was mentioned in despatches, and he took part in the Zhob Valley Expedition in 1884. He was commended for an exhaustive report on the treatment of camels in India. In 1900-1901 Pringle

served in South Africa, was again mentioned in despatches, and was awarded the medal and three clasps. If we are not mistaken, it was after his service in South Africa that he received the D. S. O. (Distinguished Service Order) medal. In 1902 he was promoted to Veterinary Lieut.-Colonel. In 1907 he rose to the rank of Veterinary Colonel; and in 1909, was made a C. B. (Companion of the Order of the Bath); and some little time before the present war broke out, he attained the highest position in the service, viz., that of Director-General, with the rank of Major-General, which he has held up to the present time, with its heavy burden of responsibility, and which has no doubt merited for him this later distinguished honor of Knighthood.

We in this country do not take much stock in titles such as those referred to, for the reason, perhaps, that we do not fully realize what they stand for; but to the British officer, in whatever branch of the Service he may be, they really mean a great deal, as they are conferred on those only who have rendered some real service to their country.

Sir Robert Pringle is a man of about 62 years of age, and a "Scot," whom the writer has known since early boyhood. Although in active service at the present time of course, he is a member of the Council of the Royal College of Veterinary Surgeons, London.

Naturally the writer is proud not only of the early companionship, but of the distinguished veterinary career, of the new Knight, which has been recognized by so many well-merited honors having been conferred on him for valuable services to his country; and we believe the profession, generally, will join in wishing Sir Robert many more years of usefulness, and, afterwards, happiness in his retirement.

W. H. D.

THE COUNTY AGENT

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

From time to time veterinarians in different parts of the country have protested against the activities of the county agent. Undoubtedly they have been justified in most instances, for the men engaged in the work are often inexperienced and lack the proper training.

In one county in Ohio the authorities were fortunate in selecting a man to act as agent who combined the training of the veterinarian with that of the agriculturist. That he has been successful is shown by the following article by John Gould which appeared in a recent number of *Hoard's Dairyman:*

'There has been and even now is, much discussion pro and con about the efficiency of the county agent. Many claim the office is not paying its keep, but in this county, (Portage county, Ohio),

there is little criticism and Dr. Miller seems very popular, notably among the dairymen who dominate fully half of the county. This county was the very first in the state to establish what is now a very general custom, and was very fortunate in securing an agent, who, both in theory and practice, was a most successful farmer as well as a veterinarian of large practice. From the start, the doctor has been wide-awake in promoting the dairy interest of his clients. As adviser of the County Improvement Association he selected quite a score of bulls of the dairy breeds and placed them in suitable locations for the free use of the dairymen. Great stress was laid upon dairy rations, what were the most suitable and economical, where they could be purchased, and their composition.

"The idea of dairy association was made prominent, notably in the selling of products and the buying of feeds, showing the value of co-operative effort over individual helplessness. To this end he was instrumental in forming some three cow testing clubs, and when the recent conflict was ripe between the dairymen and the city milk dealers, he was a very large factor in forming four auxiliaries of the Northern Ohio Dairymen's Protective Association. The doctor has also given many public and private demonstrations of the Babcock test, besides visiting many dairy farms and giving much advice and in the selection of dairy cows. He has talked alfalfa from end to end of the county as a great ration to save buying so much high priced protein, as also silo building and how to grow mature crops for it. He has held each year an institute in every township in the county. He organized a fertilizer club in every town and this has resulted in a yearly buying of 2,500 tons of fertilizers by the club at a saving of over $4 per ton. He was also instrumental in the buying of untold carloads of lime at reduced rates, because as well as the fertilizers they were paid for at the car door instead of being "timed and noted" for future payment. For three years Dr. Miller has kept "something doing" all the time, from boys' clubs to girls' contests, with a score of other items, but none more important than his work for the dairy industry of the county; and it is no more than a duty and a pleasure to note and comment upon them for the Dairyman."

This case illustrates very clearly the desirability of introducing more agricultural work in the curriculum of the veterinary college, also more veterinary work into that of the agricultural college.

Veterinary faculties should realize that the position of county agent, although a new field for veterinary graduates, is one that in the future is bound to expand. It seems to the writer that these faculties should anticipate the demand for men adequately trained in the science of veterinary medicine and the art of agriculture, and provide combination courses of study especially designed to fit the needs of such men.

Yours very truly, F. B. Hadley,
Professor of Veterinary Science.

REVIEWS

A PRACTICAL MEDICAL DICTIONARY

THOMAS LATHROP STEDMAN, A.M., M.D.
Fourth Revised Edition. Illustrated. William Wood & Co, New York, N. Y.

This work with a short appendix on weights and measures, symbols, etc., contains 1102 pages. That medicine is a progressive science is shown by the fact that nearly two thousand new words here make their appearance, since the last edition was published two years ago. Although the term medical might be inferred by many to limit the use of the work to physicians, the author has considered it in its broadest sense to include veterinary medicine, as well as dentistry, chemistry and biological science in general. To veterinary students a work of this kind is well nigh indispensable. To the progressive veterinary practitioner it is equally indispensable; for in recent years veterinary science has made rapid progress and new terms as well as new methods have been introduced.

In some dictionaries it has appeared that conciseness of the definition has been sought rather than clearness, with consequent dissatisfaction to the consultant. In the present work clearness has apparently been the main object although conciseness has not been ignored. There are numerous plates, figures in the text, lists, etc., which add much to convenience of reference. The work is a credit to both author and publisher. P. A. F.

MICROBIOLOGY; A TEXT BOOK OF MICROORGANISMS GENERAL AND APPLIED

Edited by Charles E. Marshall and written by twenty-five contributors.
186 Illustrations and 1 colored plate. Second edition revised and enlarged.
P. Blakiston's Sons and Co., Philadelphia, 1917. XXIV + 900 pp.
Price $3.00 Net.

This volume consists of a series of systematically arranged articles on wisely chosen topics in microbiology prepared by many writers. As stated by the editor, the primary purpose of this text book is to place in the hands of college students an elementary, technical treatise of the subject matter included. The scope of the book is wide as will be indicated by the appended table of contents. The preparation is somewhat unique in that the editor has

secured men recognized in their respective fields to prepare the different chapters. On this account the book is supported throughout by the prestige of special authority and on that account it is of exceptional value.

It is divided into three parts. I. Morphology and culture of microorganisms. II. Physiology of microorganisms. III. Applied microbiology.

Part I contains 6 chapters on bacteria, molds, yeasts, invisible viruses and protozoa.

Part II contains 3 chapters on nutrition and metabolism as follows: Food of microorganisms; products of metabolism; and mechanism of metabolism. It has 5 chapters on physical influences such as moisture, temperature, light and other rays, electricity and mechanical effects. Two chapters on chemical influences first, those producing stimulation of growth and second those causing inhibition of growth. The fourth division of this part contains an interesting chapter on symbiosis, metabiosis and antibiosis.

Part III takes up the general role of bacteria. There are 2 chapters on the microbiology of air; 2 chapters on the microbiology of water and sewage; 4 on the microbiology of soil; 4 on the microbiology of milk and milk products; 11 on the microbiology of special industries; 5 on the microbial diseases of plants; 1 on the microbial diseases of insects; 3 on the microbiology of the diseases of man and of domesticated animals; and one on the control of infectious diseases.

A book in which such a wide variety of subjects is discussed, each by a specialist, cannot help but be authoritative and, on the other hand, we cannot expect that so many topics can be extensively elaborated in so short a space. The book, therefore. is of unusual value to the student in general bacteriology or to those who have this wide interest in the subject and it is for such that it is designed rather than for those who are taking up any particular line as a specialty. The authors have very successfully set forth the fundamental knowledge and the guiding principles of microbiology to fit into and to prepare one for special work in any of the special fields into which microbiology has penetrated.

One finds in this book many subjects that are rather briefly discussed but on the whole it is doubtful if any author could bring so much valuable information, on so large a number of topics, into a shorter space. As a text for beginners in bacteriology it is rather

large but for advanced students or as a reference book on the general subject for those who are engaged in special lines of bacteriological work, it is to be highly commended.

There are a number of statements concerning which there may be differences of opinion. As a rule, however, the subject matter is well chosen and presented in a clear and concise manner. A carefully selected list of references to the literature on the researches in the various subjects discussed would have added much to its value for advanced or professional students. The illustrations are good and instructive. V. A. M.

DISEASES OF THE DOG

FRANK TOWNSEND BARTON, M.R.C.V.S. (Captain A.V.C.)
The MacMillan Co., New York, N. Y. Price $1.50.

This is a book of 247 pages divided into 19 chapters. Among the various chapters are those on: aids to the treatment of sick dogs, including administration of medicine and doses; canine pharmacy; detection of disease; diseases of the different systems of the body and one on wounds and their treatment.

The author has covered considerable ground in a popular manmer but has not endeavored to make every owner a "doctor". Concerning this the author states in the preface—"Diseases of the Dog and Management is primarily intended to serve as a first aid for those who have the charge of dogs either in health or sickness. It is not always convenient to obtain professional assistance, but when such aid is within reach it should always be obtained as speedily as possible, as unskilful treatment, no matter however well directed, frequently leads to disappointment and much useless suffering to the patient. .... There are minor ailments and accidents which can be effectively dealt with by the novice, and the author has endeavored to incorporate in this work the needful instructions for carrying out the elementary principles of canine medicine and surgery."

The author has kept pretty well to his purpose and frequently recommends the employment of a veterinarian. The book may be interesting to veterinarians but must not be considered as a text on the subject. H. J. M.

NECROLOGY

JEAN BAPTISTE AUGUSTE CHAUVEAU
1827–1917

An Honorary Member of the American Veterinary Medical Association.

FRANCIS DUNCAN

Dr. Francis Duncan of Ithaca, Michigan, died at his home January 5, in his forty-seventh year, after an illness of long duration. Dr. Duncan was born in the province of Ontario in 1870. He was a graduate of the Ontario Veterinary College of the class of 1895. After a period of service as an inspector with the Canadian government, he settled in Ithaca, Mich. A wife and four children are left to mourn his loss.

Dr. Duncan was a member of the Independent Order of Foresters and of the Masonic Order. He became a member of the A.V.M.A. at the Detroit meeting in 1916.

MISCELLANEOUS

—The next meeting of the Kentucky Veterinary Medical Association will be held at Shelbyville, Ky., June 20 and 21.

—Dr. Thomas P. Haslam, for three years assistant professor of Veterinary Medicine at the Kansas State Agricultural College in charge of research work, has resigned to take charge of the manufacture of blackleg and some other biological products at the Purity Biological Laboratories at Sioux City, Ia.

—Dr. Richard H. Power, veterinarian of the 5th Field Artillery has been transferred from Camp Fort Bliss, Tex. to Fort Riley, Kansas.

—Dr. H. V. Cardona has removed from Chicago, Ill. to Milbank, So. Dakota.

—Dr. F. N. Davidson has removed from Buhl, Ida. to Tecumseh, Nebraska.

—Dr. J. M. Twitchell has removed from Nashville, Tenn. to Center, Colo.

Dr. P. C. Guyselman has removed from Monte Vista to Montrose, Colo.

—Dr. A. R. Galbraith has sold his practice at Garfield, Washington and will locate at Pendleton, Oregon.

—The next meeting of the North Carolina State Veterinary Medical Association will be held at Charlotte, N. C., June 26 and 27.

—It is reported there are fourteen vacancies for Veterinarians in the U. S. Army under the legislation of last year. The next examinations will occur on July 2.

—Dr. Raymond C. Reed, formerly at the Experiment Station at Newark, Del., has gone to the Maryland College of Agriculture at College Park, Md., as head of the Department of Animal Industry and in charge of the Control work for the State Department of Agriculture.

—Dr. H. C. Johnson has removed from Adel to Linden Ia.

—Dr. W. C. Van Allstyne, Veterinarian of the 10th Cavalry is stationed at Ft. Huachuca, Arizona.

—Dr. G. E. Corwin has removed from Hartford to 87 North Whittlesey Ave., Wallingford, Conn.

—Dr. F. S. Jones of the Rockefeller Institute of Medical Research, Princeton, N. J. and Dr. J. T. Arnold of New York have returned from Patagonia, So. America, where they have been engaged for some months in studying a disease of sheep.

—The marriage of Dr. C. A. Roig of Poughkeepsie is announced.

—The new officers of the Indiana Veterinary Association are Dr. A. F. Nelson, President; Dr. J. W. Klotz, Treasurer and Dr. G. H. Roberts, Secretary.

—The Veterinary Medical Association of the Veterinary College of George Washington University held a banquet in February at the Continental Hotel, Washington, D. C. Among the speakers were Rear Admiral C. H. Stockton, J. A. T. Hull of Iowa, Dr. C. W. Stiles of the U. S. Public Health Service, and G. M. Rommel of the Bureau of Animal Industry. Dr. J. P. Turner officiated as toastmaster.

—Legal Protection Against Hog Cholera. A case of particular interest to farmers, veterinarians, and dealers in live stock has been on trial during the past two weeks in Pennsylvania before Judge Stewart and a jury in the Northampton County Court. On March 25 and April 15, 1916 the defendant, H. C. Kramlich, an extensive dealer in live stock at Northampton, Pa., offered 850 hogs at public sales. Shortly after the sales, agents of the Pennsylvania State Livestock Sanitary Board found a number of the hogs dying from hog cholera on seventy-two farms of purchasers in Northamp-

ton and Lehigh Counties. The losses aggregated about 400 head including swine previously owned on the farms which became infected from animals purchased at the sales.

The Board promptly vaccinated a large number of hogs which had been exposed to this infection. Investigation conducted by the State Veterinarian showed that the hogs were infected with cholera when Kramlich shipped them from Cumberland County, Pa. to his sales at Northampton and ordered prosecution under the livestock law which forbids the sale of animals affected with a transmissible disease.

The case was bitterly contested and attracted the attendance of a large number of farmers and livestock dealers throughout the two weeks' trial. It resulted in a victory for the Board as the jury returned a verdict of guilty. The cost in the case will be heavy as there were about eighty witnesses in attendance, including a number of veterinarians who gave expert testimony. The purchasers may bring suit against Mr. Kramlich to recover their losses.

The Board is determined to protect the farmers and livestock interests in Pennsylvania from unscrupulous or careless dealers who spread dangerous diseases among animals. This case was the first of its kind under the livestock law and it is believed that much good will result from a conviction.

—VIVISECTION. The following resolution has been sent by a committee of the Silver Bow County Medical Society of Montana to their representative in Washington:

Be it resolved by the Silver Bow County Medical Society that we reaffirm our belief in the great and lasting value of the advancements in medicine and surgery accruing from animal experimentation:

That we condemn an act on the part of our representative in Congress which may tend in any way to lessen the quantity or lower the quality of this kind of work by scientists in the United States Department of Agriculture and the Public Health Service.

In an additional statement attention is called to the great benefit that has been and is being derived from the use of preparations, involving animal experimentation, in such maladies as black leg, contagious abortion, tuberculosis, etc. Also that animal experimentation is necessary, in many instances, in protecting the health of animals and man against epizootics or epidemics that may be introduced into this country from foreign sources.

JOURNAL

OF THE

American Veterinary Medical Association

Formerly American Veterinary Review

(Original Official Organ U. S. Vet. Med. Ass'n)

PIERRE A. FISH, Editor **ITHACA, N. Y.**

VOL. LI., N. S. VOL. IV. MAY, 1917. NO. 2.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

AMERICA

"Our Father's God, to Thee
Author of Liberty,
To Thee we sing:
Long may our land be bright
With freedom's holy light;
Protect us by thy might,
Great God, our King."

RETRENCHMENT

War not only involves, as a portion of its plan, a system of entrenchment against an aggressive enemy, but a system of retrenchment as regards luxurious and wasteful methods of living. The latter fact is driven home to us by a recent statement from the U. S. Department of Agriculture which accuses this nation of wasting $700,000,000 of food stuffs. This vast amount refers to the human population. If the animal population were considered, it is probable the amount would be still further increased. In our present situation it is well to be reminded of our faults and to con-

sider how much good our wastage would have accomplished for other nations, some of which are suffering for the necessities of life.

"In emergencies it may be necessary for some patriots to unyoke the oxen and leave the plow standing in the furrow, but the lasting support of the nation requires efficient patriots to keep the plows going. The soil supports the corn; corn supports animals; corn and animals support an army; and 'armies fight on their bellies'."

We do not know what the future has in store for us; but we do known that it is better to be "safe than sorry" and that in order to be safe retrenchment is necessary. We owe it not only to ourselves but to our allies who have hitherto, and are still bearing the brunt of the strife in the battle for international law—and democracy. Under the present circumstances waste is indefensible. Especially now, but at any time, it is better to inculcate thrift, rather than waste, as a social standard.

The animal census (estimated) by the Department of Agriculture shows that although on January 1, 1917 there was an increase in mules (46,000), milch cows (660,000) and other cattle (1,037,000); there was a decrease in horses (33,000), sheep (142,-000) and swine (313,000).

The loss by disease shows a slight increment of decrease as compared with the ten year average. Veterinarians may, perhaps, derive some slight degree of comfort from this, but it points to a method by which the veterinarian, although not enlisted, may do his bit for his country and feel that every animal he saves from disease or death, every suggestion and act of cooperation with breeders in increasing production, is adding to the resources of his country and the maintenance of its population. P. A. F.

EXAMINATION OF VETERINARIANS FOR THE U. S. ARMY

The Surgeon General of the Army announces that examinations for appointment in the Veterinary Corps of the Army, will be held on Monday, May 7th and Monday July 2, 1917, at points to be hereafter designated.

Application blanks and full information concerning these examinations can be procured by addressing the "Surgeon General, U. S. Army, Washington, D. C."

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, between 21 and 27 years of age, a graduate of a veterinary school legally authorized to confer the degree of "D.V.M." and shall be of good moral character and habits.

Successful applicants will be immediately appointed (so far as the number of vacancies will permit) to the grade of Second Lieutenant, at an entrance salary of $1,700.00 per annum, with quarters, light and fuel.

In order to perfect all necessary arrangements for the examinations, applications must be in the possession of the Surgeon General at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present 21 vacancies to be filled and on July 1, 1917 there will be 11 additional vacancies.

THE VETERINARY CORPS

In accordance with the Act of June 3, 1916, establishing a Veterinary Corps for the Army, those in the service have recently received their commissions. It is the plan of the War Department at present to hold an examination for applicants for the Army Veterinary Corps in the early part of July. Upon a declaration of war an examination can be called at any time. Persons eligible for candidates for the regular Army Veterinary Corps are native-born citizens, between the age of 21 and 27 years. They will be required to pass a satisfactory examination as to character, physical condition, general education and professional qualifications. The men already in the Army Veterinary Service will form a nucleus for an organization. With the candidates that may be drawn from the young men of the country it will be possible in time to build up a desirable, efficient service. In case of emergency, as appears possible at the present time, it will no doubt be necessary to enlist the services of veterinarians in civil life beyond the age limit, and those who have demonstrated their ability to do work and are more than 27 years of age. It will not be possible, therefore, for them to enter the regular Army service. The special committee on Army Veterinary Service has just learned with much surprise and embarrassment that there is no provision made in the Act of June 3, 1916 for a Reserve Veterinary Corps. A pro-

vision was made for reserve veterinarians. They would receive the pay and allowance of a second lieutenant, but no rank. They must be graduated from a recognized veterinary college or university and must pass a satisfactory examination as to physical condition, general education, professional qualifications, etc.

On March 2, 1917, a bill known as Senate Bill 8329 was introduced by Senator Watson which provides for plans for army reorganization. It is understood that this plan is backed by the War College, and while it did not pass the 64th Congress a similar provision will be introduced in the Special Session. The following are the provisions made in it for the Veterinary Service:

Sec. 17. THE MEDICAL DEPARTMENT.—The Medical Department shall consist of one Surgeon General, who shall be a permanent officer with the rank of major general during the active service of the present incumbent of that office, and thereafter with the rank of brigadier general, who shall be chief of said department; a Medical Corps; a Medical Reserve Corps within the limit of time now fixed by law; a Dental Corps; a Veterinary Corps; contract surgeons, as now authorized by law; the Nurse Corps, as now prescribed by law; an enlisted personnel and a temporary personnel.

The permanent commissioned personnel of the Medical Corps shall consist of forty-eight colonels, one hundred and six lieutenant colonels, six hundred and forty majors and one thousand, one hundred and two first lieutenants, all appointed as now prescribed by law.****

There shall be three hundred and forty-eight veterinarians and assistant veterinarians for duty with the over-sea garrisons, the frontier forces, and the training forces, at the rate of two such officers for each regiment of Cavalry, one for every three batteries of Field Artillery, and one for each battalion of mounted Engineers and for duty with the Quartermaster Corps as inspectors of horses, mules, and meats; and the President is hereby authorized, by and with the advice and consent of the Senate, to appoint the additional number of assistant veterinarians authorized.

Candidates for appointment as assistant veterinarians shall have the qualifications and shall pass the examinations now provided for by law, with reference to rank, pay, and allowances; and the President is authorized to appoint such number of reserve veterinarians as may be required to tend public animals pertaining to the Quartermaster Corps as now prescribed by law."

It will be seen by this section that there are still no plans for a Veterinary Reserve Corps. It is proposed to amend this section as follows:

Section 17, line 7, after the words "Veterinary Corps" insert the following:—A Veterinary Reserve Corps. Section 17, line 26, after the word "Allowances" strike out the balance of the line, also what follows, and insert in lieu thereof the following:—For the purpose of securing a Reserve Corps of Veterinary officers for military service as temporary officers in the regular Army, the President is authorized to issue commissions to citizens of the United States who are graduates from a reputable veterinary school under such restrictions and with the same rank as is given to officers of the Medical Reserve Corps.

Veterinarians should realize under present conditions that unless they are eligible for the regular Army Veterinary Service there is very little opportunity to serve the country in a professional way. An effort is being made to induce veterinarians to join the American Red Star Relief. This is a desirable organization and can do a great deal to assist in caring for horses in war. It is to be understood, however, that this organization is not a part of the United States Army and a veterinarian working for it will have no rank or standing in the army. It is possible that a large number of veterinarians may join this organization. It is doubtful, however, if the representative American veterinarian can serve his country as well in this way as he could in the regular Army Veterinary Corps or in a Veterinary Reserve Corps, if one is established. We should make every effort to induce our young men to enter the regular Army Veterinary Corps and try to build up a representative army veterinary service. For the present emergency we should endeavor to provide a strong veterinary Reserve Corps made up of the best men in the profession. There is much work for us to do. The Federal Bureau of Animal Industry and those having charge of animal industries in the various states should do everything possible to conserve our animals and animal products and encourage animal husbandry. On account of the high prices of meat, leather and all animal products, there is a great tendency on the part of farmers to dispose of their animals, which can only result in a shortage in the future and this shortage will be most felt when they are most needed. The best men in the veterinary profession can render a very valuable service

to the country by assisting in purchasing animals, inspecting meat, controlling the diseases of animals in the army and civil life and looking after wounded and sick horses in war. Unless Congress can be persuaded to provide for an Army Veterinary Reserve Corps, the veterinarians above the age limit in civil life who desire to serve their country in case of war had better join the infantry, artillery, or some other branch of the service.

C. J. M.

EUROPEAN CHRONICLES

Bois Jerome.

ON THE CHEMOTHERAPY OF TUBERCULOSIS—This is the summary of an article published in the *Journal of Experimental Medicine.*

Since Ehrlich and Hata called attention to the chemotherapy of syphilis, many works have been published on that of tuberculosis. It has been proved that some aromatic substances of the anilic series; mercury, or compounds of copper, gold, silver, and the cyanides have an inhibiting action on the development of the bacillus of Koch.

After several preliminary experiments, the author of the article, Geksabouro Koga (Tokio), has prepared a compound of copper and cyanide, with chemotherapeutic action, which he has tested in animals infected with human tuberculosis bacilli.

At first, he resorted to a solution of cyanide of potassium, the mode of preparation of which he does not give, and calls it liquid A. This killed in doses of Cgr .005 for 100 grams of weight in guinea pigs and of 0.025 per kilogram in rabbits.

A control Guinea pig died with generalized miliary tuberculosis eleven weeks after the injection of tubercle bacilli; but the pigs treated by the cyanide increased in weight, when killed after the death of the control. Although one presented numerous bacilli in the lungs, liver and spleen, others showed only a few bacilli and even practically none in these organs. Therefore there was a manifest arrest in the tuberculous lesions.

The author also injected tubercle bacilli of human type in the anterior chamber of the eye of rabbits and guinea pigs. He observed that the control animals presented a generalized ocular

tuberculosis with pulmonary metastasis, while in the treated animals all the irido-corneal lesions would cicatrize and the lungs remain healthy.

Then the author conceived the idea of studying comparatively, the effect of various preparations upon the tubercular lesions. For this, he used his preparation A, another B, which contained a half smaller proportion of cyanide than liquid A, the chloride of copper, tuberculin without albumin, and the iodotuberculin.

He found that of all these preparations, the chloride of copper and tuberculin with albumin were the least active, liquid B, and the iodotuberculin were more efficacious, particularly preparation A.

Noticing that the latter was more active than liquid B, he prepared another solution containing more cyanide hoping to increase the effect of solution A. With this, he made an aqueous solution at 1-1000 which he called liquid C.

He then again prepared a double compound of cyanide of copper and potassium. An aqueous solution of this at 1-2000 became liquid D, which was fatal at the dose of Cgr .001 per 100 grams for guinea pigs and of 1-200,000 for mice. This was called cyanocuprol.

The sub-cutaneous injection of 1 c.c. of liquid D, once every five weeks was ordinarily accompanied with an increase of weight, and improvement of the macro and microscopic lesions.

The effects were not constant: while arrested in some animals, the lesions remained refractory in others.

Examining, with the microscope, the cyanide of copper and potassium, it was found that there were formed three varieties of crystals. Experiments proved that only one of these had an efficacious effect on tuberculosis.

Liquid D, prevented the development of the tubercle bacilli in culture on glycerine, when it was mixed in the proportion of 1-1000. A solution of 1-150,000 prevented the development of the bacilli in cultures on gelose-serum.

The best results were obtained in animals with the intravenous injections of 1 c.c. of liquid D per kilogram of weight, every eight days.

In a general way the macro-and microscopic actions of the drug on tuberculous lesions can thus be summarized: A single injection has no effect; but after repeated injections there was

noticed a diminution of the congestion and of the leucocytic infiltration round the lesions, the phenomena of degeneration decrease and new connective tissue appears around the lesions. At the same time, the number of bacilli diminish and finally the microscopic examination fails in detecting any.

This examination is not absolute proof of sterilization. Emulsions made with the lungs, liver and spleen of the treated animals and presenting no visible bacilli, were injected in the abdominal cavity of guinea pigs. In some of these, lesions of tuberculosis made their appearance and were evidences that absolute sterilization was not present in the animals treated.

The author promised further information on the specific treatment of tuberculosis and in a subsequent article the results that he obtained are referred to as follows:

The last preparation used by Koga is the cyanide of potassium and copper or the cyano-cuprol.

He has used it in pulmonary tuberculosis, cutaneous, renal, suppurative vertebral and from the cases in human subjects he records 28 recoveries and improvement in 21.

By recovery is meant: increase in weight, temperature below 37°, no physical signs, no bacilli in the sputa, where they were numerous before treatment and the ability of the patient to resume his ordinary occupations.

From the observations of Koga, it appears that the cyano-cuprol has a curative action upon some pulmonary and surgical tuberculous lesions and that chemotherapy of human tuberculosis has entered a new phase.

ARTICULAR GRAFTING.—Although this operation may not find common application in veterinary surgery, the subject is of sufficient interest and importance from a surgical point of view to justify consideration of the analysis made of the writings of Doctor S. Veronof of the department of physiology in the College de France.

The author has successively and progressively made a special study of: 1st, the grafting of complete small articulations; 2d, the semi-articular grafting of large joints and finally, 3rd, the grafting of complete large articulations.

In the present article only the results of the experiments of

the first series are considered, viz: those with metacarpo-phalangeal articulations.

All the experiments were carried out on large sized dogs and they consisted in making a metacarpo-phalangeal joint take the place of another. This was done upon the same paw, so as to not incommode the animal and left him with the use of his three legs.

To fix the graft, metallic sutures were omitted because of the traumatic action on the bone, causing a rarefying osteitis which promotes the separation of the graft. Fixation was made only by catgut suturing of the prolongation of the periosteum left on it and on the extremities of the bone upon which the grafting was made. The subcutaneous tissues were afterwards sutured on the graft so as to hold it tightly and sustain it.

Six dogs were operated in this manner; with all, the articular graft has given an excellent functional result. Radiography showed the grafted piece well united with the metacarpus and phalanges between which it had been placed, after resection of the original articulation.

Three months after the grafting, the articulation was found moveable, the dog walked and ran without the slightest lameness.

Three of the dogs were killed respectively after six, five and a half and five months and the histological examination was then made. It was observed that the grafted articulations were largely covered with blood vessels and bled freely when they were cut off: they had kept their motility, the bony extremities of the new joint were united solidly to the diaphysis of the metacarpi and of the phalanges. The histological examination showed the cartilages transformed partly into connective tissue. Even after six months this transformation was not completed.

The condition of the graft after one year differed considerably from that of the dog examined after six months. While in the latter the layer of covering cartilage was isolated from the bone underneath by reticulated connective tissue, on that after one year, there was a continuous layer of cartilage.

As to the change on the bone in the articular grafting, it was noticed after one year that the bony cells of the graft had undergone an almost complete degeneration and that the substance of the graft was entirely resorbed. Yet a new bone had been formed by the periosteum and the layer of osteogenous cells assisted by the marrow of the bone.

Interesting Morvo-Farcinous Affection.—In the *Recueil* of last November, Mr. Bringard has recorded a very peculiar case which is full of interest and valuable information. It has brought out several clinical points: showing that in the same animal distemper can develop and run its course along with the existence of glanders, and that the old classical statement must now be ignored, that if enlarged lymph glands of the intermaxillary space degenerate into abcesses, ulcerate and heal, the subject is not a glanderous animal. The case also shows that the simultaneous evolution of glanders and distemper disturb in a very marked manner the reactions of mallein. If the said reactions are sometimes interfered with by distemper, they yet furnish important indications to the one who knows how to understand them. For instance, in the case recorded the following indications would have been sufficient to establish the diagnosis, as may be seen by the description of the case which is summarized as follows: reaction not very marked but identical in the two palpebral injections, the right and the left, followed in the subcutaneous test by a slight but manifest and undoubted hyperthermia with excessive sensibility of the edema at the point of injection; then the permanent febrile condition which also added to the information obtained by the mallein.

Here is the history of the case:

"A Canadian horse arrived from America with the report that he had been exposed to glanders. After a few days he received an intradermo palpebral injection. His reaction was considered doubtful, because he was in a full crisis of abundantly suppurating abcesses of the maxillary space. A second malleination was made on the other eye with similar results, and identical reaction. Four days afterward, when the febrile condition seemed to subside, he had a subcutaneous test, which gave an unsatisfactory result, the local reaction only was quite suspicious, a wide and painful swelling but no lymphatic cords as is commonly observed in glandered subjects. The hyperthermia was only 0.5°

The subject was placed under observation. After six days all the symptoms of distemper had disappeared and the intermaxillary abcesses were all healed. During that time a small cutaneous abrasion near the stifle joint instead of cicatrizing, showed a lymphatic cord which passed towards the flat of the thigh and had several buds on its course. These suppurated and healed.

On the left shoulder there appeared another lymphatic arborization, which passed away after a few days. Numerous little tumors had also made their appearance on the ribs, neck and withers. They were of various sizes but differed from farcinous buds by the great thickness of their walls and their contents, which was a white creamy pus deeply situated. Bacteriologic examination showed only the presence of the streptococcus of distemper and no trace whatever of the bacillus of glanders.

Was it indeed a single peculiar case of distemper? Another bacteriologic examination was made. This time with the pus from one of the lymphatic buds instead of one from the cutaneous as before. The bacilli of glanders were then identified in a positive manner. The disease assumed a more rapid and characteristic course, chancres made their appearance on the septum nasi and the horse was killed.

The postmortem revealed most extensive lesions of pulmonary glanders. Lymph glands of the thorax were hypertrophied and purulent and the farcinous buds were also characteristic but contained pus analogous to that met with in distemper. Both diseases were certainly developed in the same animal.

VALUE OF INTRADERMO-PALPEBRAL MALLEINATION—Evidently with all the praise that has found its way in all the veterinary publications available in our day, the value of the mode of malleination by the intradermo-palpebral injection, it would seem that no more can be said. But why not? If the testimony of a high authority comes to amplify the results obtained by others.

Major Frederick Hobday, F.R.C.V.S., of the Army Corps, has published in the *Veterinary Journal* a manifest which adds to those already known and he refers to the fact that a trial of the method has been made of over two million doses. This has permitted him to draw conclusions similar to those already expressed by many others.

He says: its advantages over the subcutaneous cervical method are specially noticeable in time of war and where exceedingly large numbers of horses have to be speedily tested. In the first place it is of great advantage to reduce the bulk of material carried or sent about and it is easy to see that 5,000 or 10,000 doses of two minims each occupy less room and are of less weight than 5,000 or 10,000 doses of 18 minims each.

Then again, the result is much more readily seen for it is only a matter of a few minutes to inspect 200 or 300 horses when one has only to glance over the eyes. Swelling in the region of the eyelids is so much more perceptible than a swelling in the subcutaneous region of the neck.

Thirdly, the test itself is a more delicate one than the subcutaneous neck method in that, the reaction is more violent and more rapid. No temperature testing is required and the saving of time and trouble in this respect is enormous.

Fourthly: The cost of a dose of the intradermo-palpebral mallein is about one-eighth of that of a dose of the neck mallein.

Fifthly: It is much easier of application and can be done much more readily—a consideration of importance when doing hundreds of horses daily.

After eighteen months of personal experience on thousands of animals, the above points were verified and the method was the one preferred.

The final question advanced by Prof. Hobday covered by his high authority is simple. It is the best method to use with a large number of horses, as at the present time, a time of war. The convenience of transport, the dosage, the convenience of the administration, after one has given a few doses, the great advantage of visibility for the subsequent inspection and the more marked reaction to be obtained in the delicate tissues which surround the eye, and the fact that there is no need to take temperatures, gives to the intradermo-palpebral method a superiority over any other method which has up to the present day been brought before the profession.

The opinion seems to be universal.

VACCINATION FOR EPIZOOTIC BOVINE ABORTION—The *Veterinary Record* has published from the Board of Agriculture the following extract relating to epizootic bovine abortion, which will interest our friends in America, who may have opportunities of applying measures against this disease.

There are two methods of dealing with epizootic abortion once the disease exists in a herd, (a) by picking out and isolating the healthy, (b) by vaccinating all the cows and heifers before they become pregnant.

In the first mentioned method, blood is taken from each of

the pregnant animals and examined by the agglutination test. All negative reactors, that is to say, the presumably healthy cows, are removed to clean buildings and separate assistants and attendants are provided. This method is only applicable if an owner is in a position to provide the necessary arrangements for complete isolation, and the proportion of initial infection is not too high. If both these conditions do not obtain the method cannot be considered nor is it likely to give good results if the disease has been in existence for some months.

The second method, vaccination, aims at artificially rendering the animals sufficiently resistant to the disease to enable them to carry their calves to full time, notwithstanding the presence of natural infection in their surroundings.

If left unvaccinated in the midst of infection, the various members of an infected herd as a rule become resistant and abortion is then confined almost entirely to heifers and other new animals brought in. Before this occurs, however, very considerable losses in calves and milk are usually experienced.

Vaccination also aims at reducing these losses by rendering the animals resistant before they become pregnant, and by establishing a high degree of resistance in the herd in a time shorter than that required for the natural process to operate.

The vaccine—antiabortion A—is composed of exceptionally rich cultures of living bacilli, obtained by cultivating them in a particular way. The immunizing dose is a large one (50 c.c.).

This vaccine should not be referred to as "serum", as this apart from being incorrect, causes misunderstanding on the part of stock owners. There is no serum which is of any use against abortion. Vaccines consisting of dead bacilli are sometimes advertised for sale as preventive and curative remedies for abortion. Such vaccines were first tried by the Board on some hundreds of animals, under the name of "antiabortion B" and this method of injecting dead bacilli besides being troublesome and expensive, owing to the repeated injection, was found to be useless for curative and preventive purposes. Results can only be expected from the use of living vaccines and it is advisable to ask for an assurance that the vaccine, if it be purchased, consist of living bacilli, unless it is specially stated to be so.

Before resorting to vaccination the objects and requirements of the method should be fully explained to the stock owners so

that he may be sure its adoption will suit his business. The following may be noted:

1—Animals already pregnant must not be inoculated, otherwise they may abort.

2—There is no curative or preventive treatment for pregnant animals.

3—After a non pregnant animal has been vaccinated, it should not be served until a period of two months has elapsed. This period is to allow for resistance to establish itself, and for the active bacilli to be got rid of from the system.

4—Full time calvers in infected herds may be vaccinated as soon as they have cleansed and recovered from the calving.

5—If the injection is carefully carried out there should be nothing more than a small and temporary local swelling at the site of inoculation. There may be a slight drop in the amount of milk for a few days.

6—Antiabortion A is issued free of charge on application through a veterinary surgeon. A short form of application is to be filled by the owner of a herd giving the history in relation to the abortion.

9—"*Turning to the Bull*" is very troublesome on a number of farms. A small proportion of cows which have aborted may remain sterile owing to lesions resulting from the abortion disease. Turning, however, when it prevails in a farm, appears to be a different disease altogether. Sometimes it prevails at the same time as abortion, in others turning is prevalent when abortion does not exist. Information as to its existence on premises for which vaccine is desired should be made known by the veterinarian.

SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

JOURNAL OF COMPARATIVE PATHOLOGY AND THERAPEUTICS—Specific serum treatment of wounds—Sheep scab—Early history of veterinary literature and its British development.

VETERINARY RECORD January. The diagnosis of foot-and-mouth disease—(O) Post mortem lesions.

VETERINARY NEWS January. An unusual case—Vaccine therapy in practice.

VETERINARY JOURNAL Stricture of the pylorus in cattle—(O) Treatment of gangrenous mammitis in cattle.

La Clinica Veterinaria—Dec. Contagious abortion in mares.

Revue Generale de Medecine Veterinaire—Dec. Contribution to the history of glanders—(X) Treatment of cartilaginous quittor.

Revue de Pathologie Comparee—(X) Fight against bovine tuberculosis.

Recueil de Medicine Veterinaire—Epizootic lymphangitis—(X) Filiform drain in veterinary medicine—Loco horse disease—Incubation of epizootic lymphangitis—(O) Torsion of the uterus in slut, hysterotomy.

Bulletin de la Societe Centrale—(O) Pseudo tuberculosis of swine—(O) Fatal renal hemorrhage in steer—(X) contribution to the treatment of tetanus.

Annales de L'Institut Pasteur.—Dec. (X) Bacterian flora of war wounds—Preparation of the cord catguts—Origin and distribution of urea in nature.

Bibliographic Notice—A case of anthrax with plates by Drs. G. G. Reinle and R. A. Archibald.

University of Pennsylvania, School of Veterinary Medicine, Announcement for season of 1916 and 1917.

Bureau of Animal Industry—(X) Report of the Chief—Circular 173, The sanitary construction and equipment of abattoirs and packing houses.

Reprints from the *Journal of Agricultural Research*—Immunity Studies on Anthrax Serum, Drs. A. Eichhorn and W. N. Berg and R. A. Kelser of the Bureau of Animal Industry.

Diagnosis of tuberculosis by complement fixation with special reference to bovine tuberculosis by A. Eichhorn and A. Blumberg.

The use of energy values in the computation of rations for farm animals by H. Prentiss Armsby.

Observations on 2800 pigs inoculated with hog cholera virus by Dr. H. Preston Hoskins.

A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

—Dr. Duncan McEachran has received an honorary diploma from Macdonald College, Quebec. Dr. McEachran was born in Scotland in 1841, being a member of one of the oldest families in Kintyre. He came to Canada in early life and established the Montreal Veterinary College of which he was Principal and Professor of Veterinary Medicine and Surgery. He has written numerous bulletins and reports on professional subjects, and is the author of "The Canadian Horse and His Diseases". He now owns and operates a large farm, "Ormsby Grange" at Ormstown, Que.

—The graduating exercises of the class of 1917 of the Kansas City Veterinary College were held at the College Auditorium April 11.

STUDIES IN FORAGE POISONING—IV.*

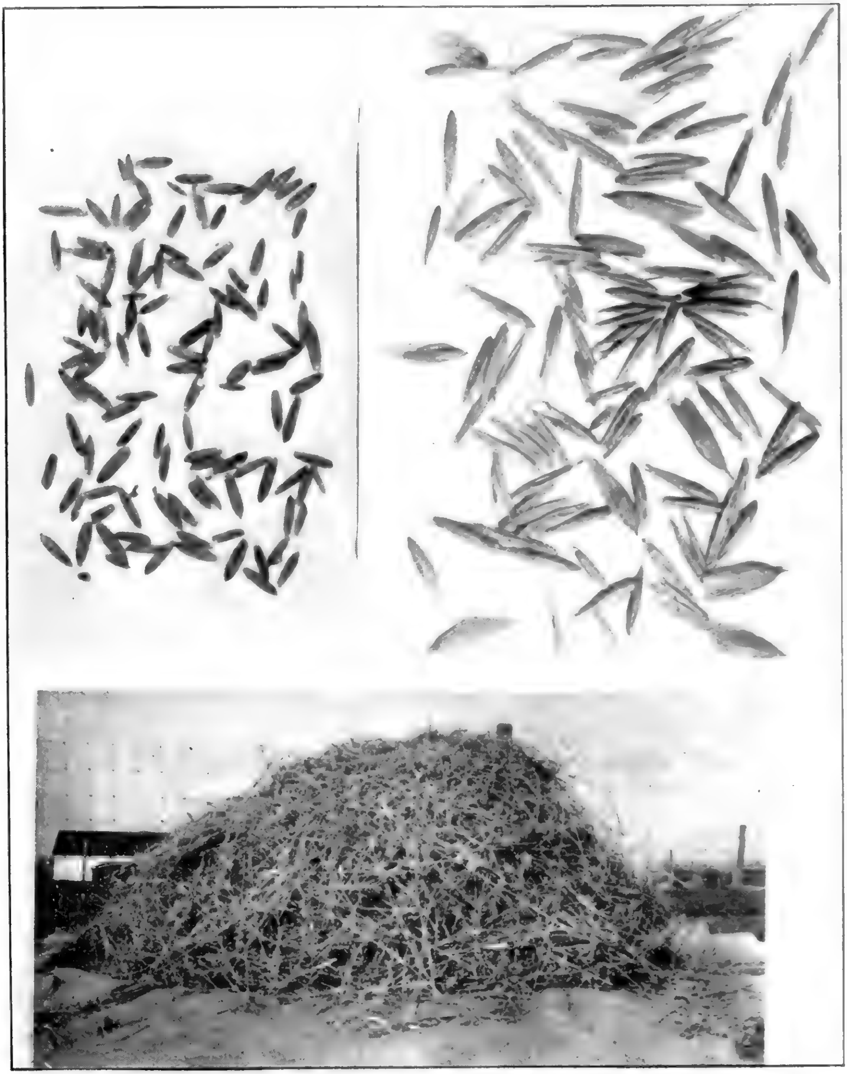
Robert Graham and L. R. Himmelberger
Kentucky Agricultural Experiment Station,
Laboratory of Animal Pathology,
Lexington, Ky.

The sporadic occurrence of diseases resembling forage poisoning in horses, mules and cattle while consuming various feed stuffs, has been reported from practically all parts of the United States since 1867. The history and description of an outbreak of a disease among horses and mules observed on the Griffith stock farm in central Kentucky, and of subsequent feeding experiments with an oat hay obtained from this farm, to large and small animals (i. e. horses, mules, sheep, goats, swine, rabbits, guinea pigs, chickens and white rats), have been reported. The feeding of the oat hay to horse and mule stock resulted in muscular incoördination and prostration, invariably terminating in death, but the other experimental animals were apparently non-susceptible. The course of the disease, together with the anatomic alterations observed on autopsy, prompted a diagnosis of forage poisoning.

In our feeding experiments death in horses and mules, preceded by symptoms analogous to those manifested by afflicted animals in the original outbreak, occurred as a result of feeding the grain threshed from the oats, the oat straw, and a foreign material found in the oat forage subsequent to threshing—composed principally of chicken fecal excreta. Water which had percolated the oat grain when consumed by experimental horses for a period of days, with wholesome feed, resulted in death. Blood transfusions from affected horses to healthy horses, mules, cows, sheep, swine, goats, guinea pigs, white mice and rabbits, furnished evidence that the disease could not be transmitted by this method. The feeding of the original unmodified oats in question to the animals enumerated, with the exception of horses and mules, was followed by apparently no change in health. It was definitely proven that the agent responsible for the disease was incorporated in the oat hay, though the feeding of this forage *ad libitum* to some horses for a period of two to four days, followed by wholesome rations, produced no apparent ill effects.

*Presented at the meeting of the A.V.M.A., Detroit, Mich., August 1916.

PLATE I.



The oat hay and oat kernels which produced death when fed to horses.

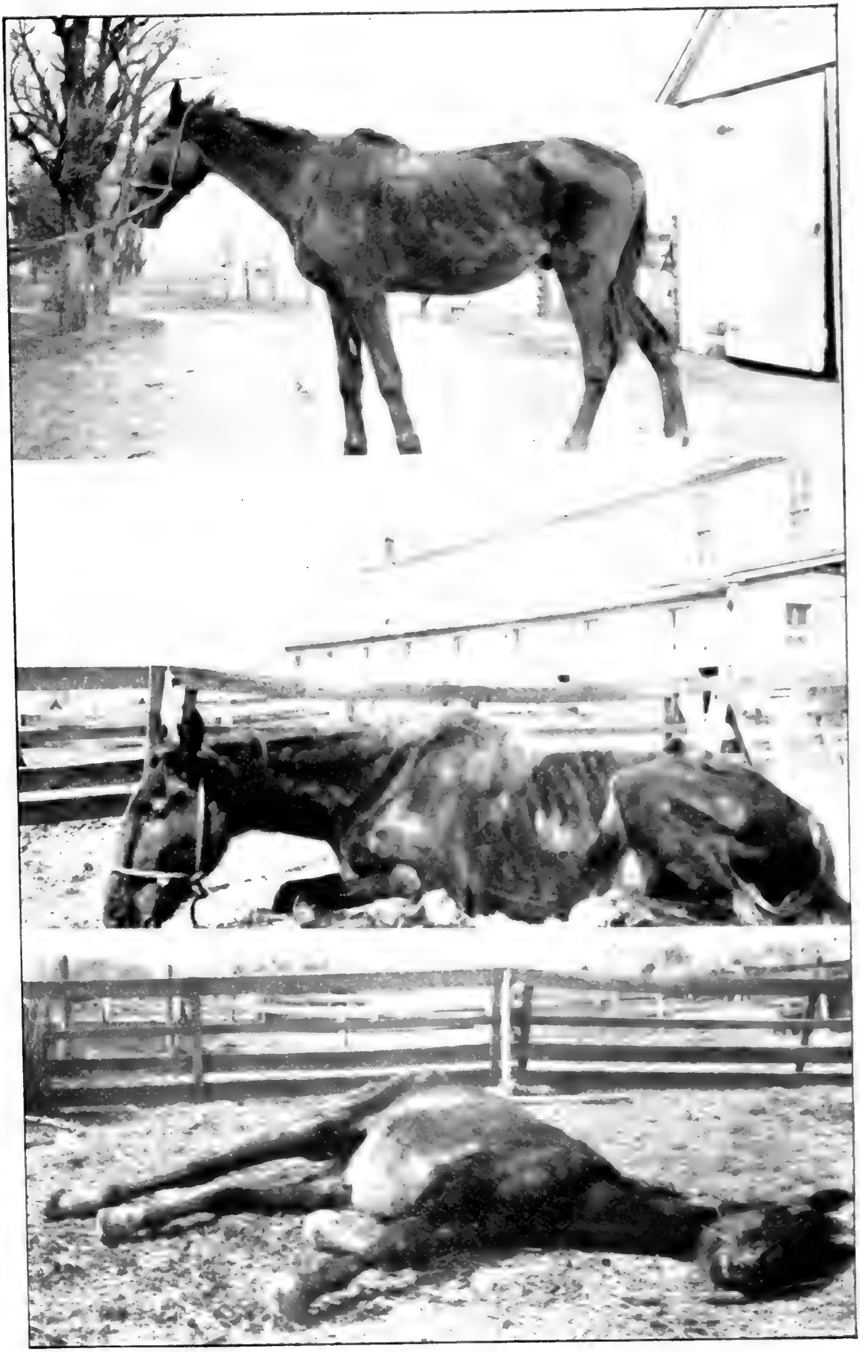
The mechanics of the invading poisonous principle incorporated in the oat hay, as observed in experimental horses, suggested hypothetically a cumulative action affecting the motor and respiratory centers; further, that the fatal agent incorporated therein is, as far as we have been able to ascertain, estranged from etiologic factors responsible for toxemia-like conditions encountered in other animal infections wherein blood transfusions as well as body organs and body excretions from affected animals serve to propagate the infection. All attempts to transmit the disease artificially from affected horses to healthy horses, as mentioned above, and by the feeding of various tissue from affected animals—i. e. the liver, spleen, brain and intestinal contents—disguised in wholesome feed, resulted negatively.

Attempts to isolate and cultivate a pathogenic microorganism from affected animals, particularly from the nervous system, which might bear some relation to the disease subsequent to artificial cultivation and inoculation into apparently susceptible animals (horses and mules), were not attended with success. A coccus-like organism isolated from the cerebro-spinal fluid of one affected animal proved non-pathogenic when injected into healthy horses, guinea pigs and rabbits. Plantings from the liver, heart blood, and spleen of horses that had suffered from the disease, were made immediately after death on corn agar, plain agar and serum agar and incubated under aerobic and anaerobic conditions, resulting occasionally in the isolation of colon-like bacilli and various saprophytic bacteria, while in some instances the plates remained sterile. The plating of blood drawn aseptically from affected horses in a moribund condition was suggestive that no pathogenic microorganism commonly prevailed in the blood stream before death which could be cultivated upon the media employed.

The true etiology of forage poisoning is a subject of great uncertainty. Hutyra and Marek speak as follows:[2]

"Bacteriological investigations have, therefore, not as yet given any perfectly satisfactory results, although it is probable that Siedamgrotzky and Schlegel, Johne, Ostertag, Streit, Grimm, Christiani, Marcq and possibly also Wilson and Brimhall, were dealing with the same organism which had in some way varied its characters somewhat. Further investigations are necessary to decide whether the cause of so-called Borna disease is always present in cases of cerebro-spinal meningitis in the horse, and whether it plays any part in the production of the disease in other species,

PLATE II.



No. 1. An animal showing the dull, depressed attitude from eating the poisonous oat hay.

No. 2. Same animal two hours later.

No. 3. The same animal three hours later, which illustrates the rapid progress the disease makes after the preliminary symptoms are manifest.

at least in a proportion of cases. The observations of Prietsch, Walther, Pröger and Wilson and Brimhall appear to indicate that this is the case. A solution is also required to the question as to what relationship exists between the organism described by Johne and others to the *Diplococcus intracellularis* of the human subject. According to Johne the two may be distinguished by the fact that the organism which occurs in the horse may be present in the central nervous system without causing lesions but simply an intoxication. According to Ostertag there is no connection between the two organisms. Christiani, on the other hand, was unable to find any differences between the streptococcus found by him and the *Diplococcus intracellularis* of Weichselbaum. There is a possibility that epizootic cerebro-spinal meningitis in the lower animals is not an etiological entity, and as the *Diplococcus intracellularis* and the *D. pneumoniae* occur in man, each may be responsible for epidemics of the disease in the human family."

A portion of literature regarding the etiology of forage poisoning is devoted to a discussion of the common moulds. Mohler[3], Klimmer and others from various observations suggested that forage poisoning might be closely related to mouldy feed; Haslam[4] regarded moulds as a possible factor in some outbreaks; Buchanan[5] isolated *Monascus purpureus* (Went) from a silage which resulted in death when fed to horses; Healy and Garman[6], as well as the authors, isolated a similar mould from feed associated with a similar disease in horse and mule stock in Kentucky. The mould theory seems most plausible but experimental feeding and inoculations with certain moulds suggest that their relation to this disease is insignificant. Brown and Ranck[7] call attention to the poisonous property of the sclerotia of *Claviceps paspali*, a visible fungus growth occurring on a wild grass "paspalum" in Mississippi. We have not observed this particular mould in our studies, in fact no visible mould contamination was noted on the oat hay which formed the basis of our work. *Monascus purpureus* (Went) was isolated from the forage in question and artificially propagated for the purpose of feeding and injecting horses.

The theory of toxin or poison-producing organisms as a cause of this disease is supported by post mortem findings in fatally afflicted animals in many forage poisoning outbreaks, but some of the moulds isolated from apparently poisonous forage seem to possess limited toxic power as cultured under artificial conditions, suggesting that the fatalities in animals resembling forage poisoning might be due to microörganic life other than moulds, or pos-

PLATE III.

Characteristic facial expression of animals preceding permanent decubitus in forage poisoning as a result of feeding an oat hay.

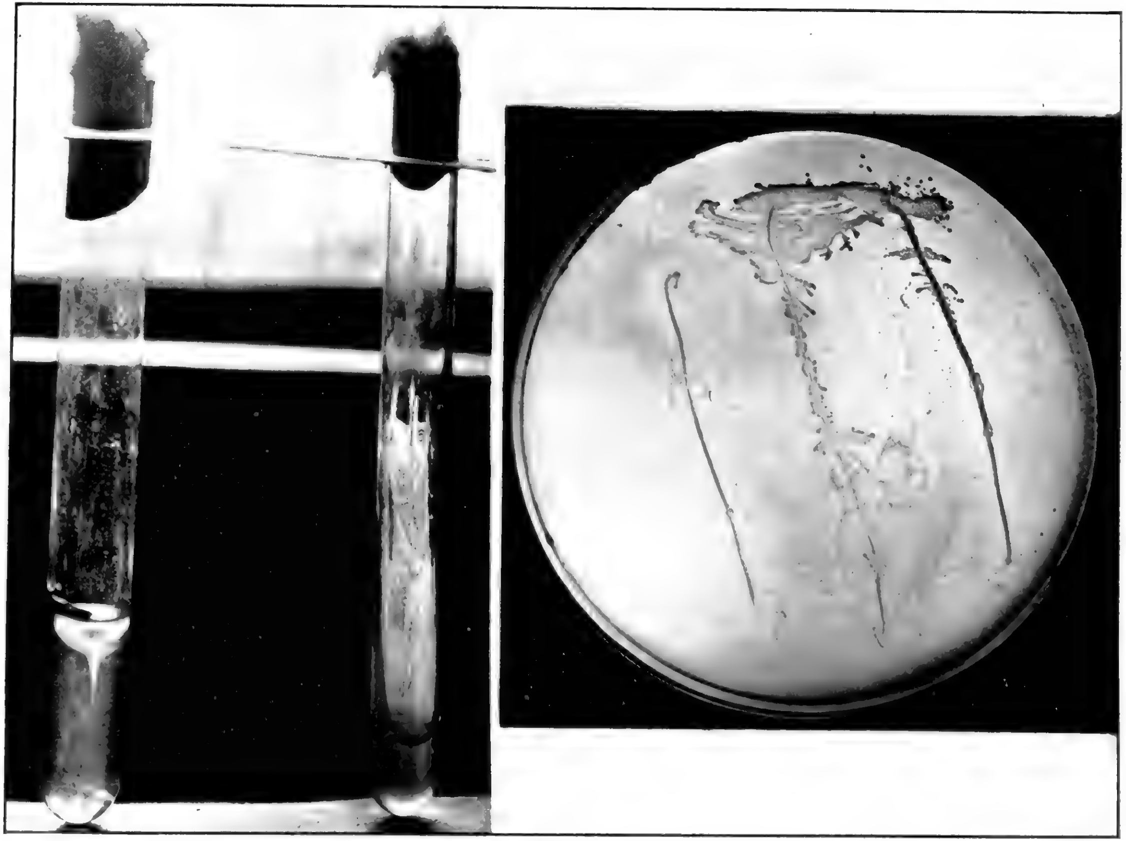
sibly to an agent even more remote. In this connection, negative results were obtained by feeding *Monascus purpureus* (Went)[8] isolated from the oat hay to experimental horses. Intravenous injections of the sterile filtered growth products of this mould were not productive of toxic symptoms. Guinea pigs, white rats and rabbits gave like negative results.

Further bacteriological examination of the oats in question resulted in the frequent isolation of organisms of the *B. coli* type. The intracellular protein poison ascribed by Vaughn and Novy[9] to various bacteria, including pathogenic and non-pathogenic varieties, suggests the possibility of certain bacteria multiplying on forage, followed by disintegration and release of cell contents. In this connection it is evident that the harvesting and storing of forage for winter feeding, as well as other factors, would militate against the growth of strictly aerobic bacteria and result in bacteriolytic changes.

The prevalence of *B. coli* on small American grains, as noted by Rogers, Clark and Evans,[10] suggested the remote possibility of some varieties of *B. coli* possessing virulent properties, and prompted the cultivation in large quantities of similar organisms isolated from this forage for feeding experiments with horses over certain periods of time, disguised in wholesome feed. We were unable to obtain evidence that *B. coli* species as isolated from the forage in question and grown under artificial conditions, were primarily involved in the disease observed as the result of feeding the original oat hay.[11] In some horses the feeding of these organisms over periods of time produced a dull attitude, indifferent appetite, and often a diarrhea. It was suggested in our experiments that *B. coli* species existing on forage in sufficient quantities might be a factor in such disturbances as malnutrition. The intra-jugular injection of colon-like organisms as isolated from the oat hay, into horses, was followed in most instances by manifestations of intoxication, the symptoms of which generally disappeared in a few hours. Experimental horses receiving daily intravenous injections apparently developed a tolerance.

In continuing the bacteriological study of this forage, numerous platings in varying dilutions and on different media (such as oat agar, serum agar, et cetera), were undertaken primarily to ascertain a more complete knowledge of the bacterial flora of the forage. During the course of these studies a bacillus was isolated

PLATE IV.



Gelatine stab, agar slant and streak plate culture of spore forming, Gram-negative, aerobic bacillus isolated from the oat hay, and designated in this paper as 0-1 and 0 1 culture.

from the oats which possessed pathogenic properties when administered to horses. The cultural characteristics of this bacillus have been mentioned in a previous publication, as follows:

MORPHOLOGY:—*Staining Properties*: Bacillus, .4 to .5 of a micron wide and from 1 to 2 microns long, occasionally longer, with rounded ends. In newly isolated cultures it resembles a coccoid bacillus. It occurs singly, chains of two bacilli being rarely found. It is motile, possessing flagella. Spores are produced, as demonstrated by heating a broth culture to 80°C. for fifteen minutes and subculturing, as well as by staining reactions. It is stained by the ordinary aniline dyes, though often unevenly with a tendency to grouping in the field. Gram negative. The optimum temperature is 35° to 37°C. Aerobic, satisfactory growths not being obtained under strictly anaerobic conditions.

CULTURAL CHARACTERISTICS:—*Agar Plate*: Small bluish-white colonies make their appearance in twenty-four hours as surface and frequently subsurface colonies in poured plates. Surface colonies increase in diameter after two or three days' incubation, and are oval or round, occasionally spreading over the surface. Rosette figures may be observed. Subsurface colonies remain small. Under magnification of fifteen diameters they are of a yellowish amber color. Not sensitive to variations in alkalinity or acidity of culture medium.

Agar Slant: A thin growth along the line of inoculation is quite visible in twenty-four hours; isolated colonies at a distance from the line of inoculation are also common. As the growth becomes heavier it may show echinulate formations along the line of inoculation, more marked at the base. A whitish or amber tinge is observed in older cultures and the growth may be continuous and compact, with a wrinkled surface. Growth of a butyrous-like consistency in young cultures. An unpleasant odor is sometimes detected in old cultures.

Gelatine Stab: The growth on the surface is abundant, developing faintly along the line of inoculation. Slight liquefaction observed after one week.

Litmus Milk: Peptonization.

Gas Production in Sugar Broth: No gas formed in maltose, raffinose, saccharose, rhamnose, dextrose, inulin, lactose, and mannite broth. No appreciable acid formed.

Indol and Nitrite Production: Indol production could not be detected in Dunham's solution. Nitrates not reduced.

PATHOGENESIS. Approximately forty experimental horses were artificially exposed to this bacillus. The results of feeding the original oats to small laboratory animals suggested that they would not be suitable for determining the pathogenic character of microörganic growth isolated from the forage.

*A bacillus possessing similar cultural characters was isolated from an ensilage in a later outbreak wherein fatalities in cattle were reported. For convenience the bacillus isolated from the oat hay will be designated in this paper 0-1 or 0-1 culture, and the bacillus from the ensilage N-1 or N-1 culture, to accord with the laboratory index.

SUSCEPTIBILITY OF HORSES: A single intravenous injection of 0-1 culture from an agar slant in normal salt solution frequently caused manifest discomfort. Following the injection the animals presented a dull and stupid attitude and yawned frequently. Sometimes twitching of the muscles in the neck and gluteal region was observed, which occasionally culminated in pronounced clonic spasms in the posterior extremities, during which the animal would almost fall to the ground. In some animals respiration was increased. The manifest nervous symptoms appeared in most instances in from five to sixty minutes following injection and gradually subsided in a dull, stupid appearance in six to ten hours. Subsequent to intravenous injection difficult deglutition and mild salivation were observed in some horses. Daily injections resulted in symptoms of varying intensity and peristaltic action became greatly diminished. Marasmus was apparent from daily injections, and prostration and death followed in three to fifteen days. Animals in a recumbent position were unable to rise and usually died in a few hours or days. Similar daily injections in cattle, sheep and goats were frequently followed by increased respiration, stupor, incoördination and emaciation. An experimental calf weighing 100 lbs. became paralyzed in the posterior extremities eight days subsequent to four daily intravenous injections of 0-1 culture washed from agar slants. During the interim this animal appeared normal. Cattle, sheep and goats were not as susceptible to daily intravenous injections of this bacillus as were horses and mules, in our observations. In illustration of the effects observed from daily administrations of 0-1 culture washed from agar slants, see Horse B.M., Chart No. 1.

HORSE No. B.M. *Treatment*: From October 30th to November 9th, this animal received daily intravenous injections of 0-1 culture from agar slants in salt solution. (No injections were given on November 1st and 7th.) The cultures used varied from

*Attempts to isolate a similar bacillus from a third forage which proved poisonous to horses resulted negatively.

four to twenty-four days old, and those showing the most luxuriant growth were selected each day.

Syndrome: The symptoms manifested by this animal during the course of the experiment may be summarized as follows: pharyngeal incoördination; muscular tremor following injection, subsiding in a few hours; stupor; weakness; marasmus; inability to stand; marked decrease of peristalsis; permanent decubitus; coma and death.

Anatomic Alterations: Brain and lungs congested; a few petechial hemorrhages in pericardium, myocardium and endocardium; no macroscopic changes observed in the liver; limited areas (2 to 5 cm.) of the mucosa of small intestine congested with submucous hemorrhages; kidneys soft and friable; body and visceral lymphatics apparently normal. The post mortem lesions were not as pronounced or as extensive as the clinical manifestations suggested.

Chart No. 1.

Horse B. M. Received intravenous injections of 0-1 culture from agar slants in salt solution.

Date	Time	No. Agar Slants	Temp.	Resp.	Pulse	Symptoms noted following injection
Oct. 30	2:00 p. m.	3 in 20 c.c.	99.5			Muscular tremors; depression.
Nov. 1	9:00 a. m.		99.8			Awkward mastication; seemed dull
	2.00 p. m.		97.6			and drowsy; decubitus.
2	11:00 a. m.	4 in 25 c.c.	99.8			Difficult deglutition; slow mastication of feed; dilated rectum. Fifteen minutes following injection yawned frequently; muscular tremor; sleepy, dull appearance; slight salivation and
	2:00 p. m.		100.4		66	chewing; nasal discharge.
3	11:15 a. m.	1 in 50 c.c.	99.0	18	48	Dull and stupid; muscular tremors.
4	10:25 a. m.	3 in 40 c.c.	99.4	18	48	Appetite indifferent; swelling in jugular furrow at point of injection; slight muscular tremor.
5	11:00 a. m.	8 in 60 c.c.	99.0	28	48	Decreased appetite.
6	11:00 a. m.	6 in 95 c.c.	99.4	22	48	Dull attitude; muscular tremor; indications of pharyngeal incoördination.
8	1:30 p. m.	2 in 60 c.c.	99.0			Weakness more pronounced; muscular tremors.
9	10:00 a. m.	5 in 100c.c.	99.1	24	30	Decubitus following injection; muscular tremor; would grasp viciously at hay and hold it in mouth; moving feet in semi-circle, accompanied by labored breathing; followed by normal respiration when in a comatose state. Death at 5 p. m.

USCHINSKY'S PROTEIN-FREE MEDIUM. In guarding against complications involving the medium which might occur following intravenous injections in experimental animals, 0-1 and N-1 bacilli were planted in Uschinsky's protein-free medium*. The sterile uninoculated medium was administered intravenously under aseptic precautions to a control horse daily in doses of 500 to 1,000 c.c., as indicated in chart below:

CHART NO. 2.

Horse D. H. Received intravenous injections of Uschinsky's Protein-free medium.

Date	Quantity Injected
December 13	500 c.c.
14	500
15	500
20	1,000
28	1,000
30	700
January 8	1,000
10 to 24	500 daily

No observable effect was noted as the result of these injections, other than mild edema in the jugular furrow resulting from needle punctures, suggesting that this medium might be used intravenously in limited quantities without complications.

STERILE FILTRATE OF ACTIVE 0-1 CULTURE IN USCHINSKY'S PROTEIN-FREE MEDIUM. Single intravenous injections of 0-1 culture filtrates, four to eleven days old, were followed by manifest symptoms, which subsided in a few hours, while daily injections terminated in muscular incoördination, decubitus, coma and death. Daily injections of similar filtrates in cattle resulted frequently in stupor, altered respiration and marasmus. In most instances horses withstood daily injections for eight to fifteen days. Sterile filtrates of 30 to 60 day old cultures produced similar symptoms and death. Variation was noted in the intensity of the symp-

*Uschinsky's protein-free medium: To one liter of water, add—

Asparagin	3.4 grams
Sodium chloride	5.0 grams
Calcium chloride	.1 gram
Potassium phosphate	1.0 gram
Ammonium lactate	10.0 grams
Magnesium sulphate	.2 gram

When these ingredients were thoroughly dissolved, 40 c.c. of glycerin were added. After sterilization by the usual method, this medium was allowed to incubate for several days at 37°C. before injection.

toms preceding recumbency in experimental horses, yet horses receiving daily injections of the sterile filtrate became permanently recumbent and presented clinical manifestations similar to horses fatally affiicted as a result of eating the oat hay. A small number of experimental horses in our observations possessed a tolerance to intravenous injections of similar filtrates in synthetic media, which enabled them to survive when the injections were discontinued, though in a weakened, debilitated condition. Other experimental horses became prostrate in a few hours following the second to fifth daily intravenous injection, terminating in death in a few hours or a few days. During the interim the animal lay in a semi-conscious state, moving the feet rapidly in a semi-circle or resting quietly. The effect in experimental horses of the sterile filtrate of 0-1 culture grown in Uschinsky's medium is illustrated in Horse No. 43.

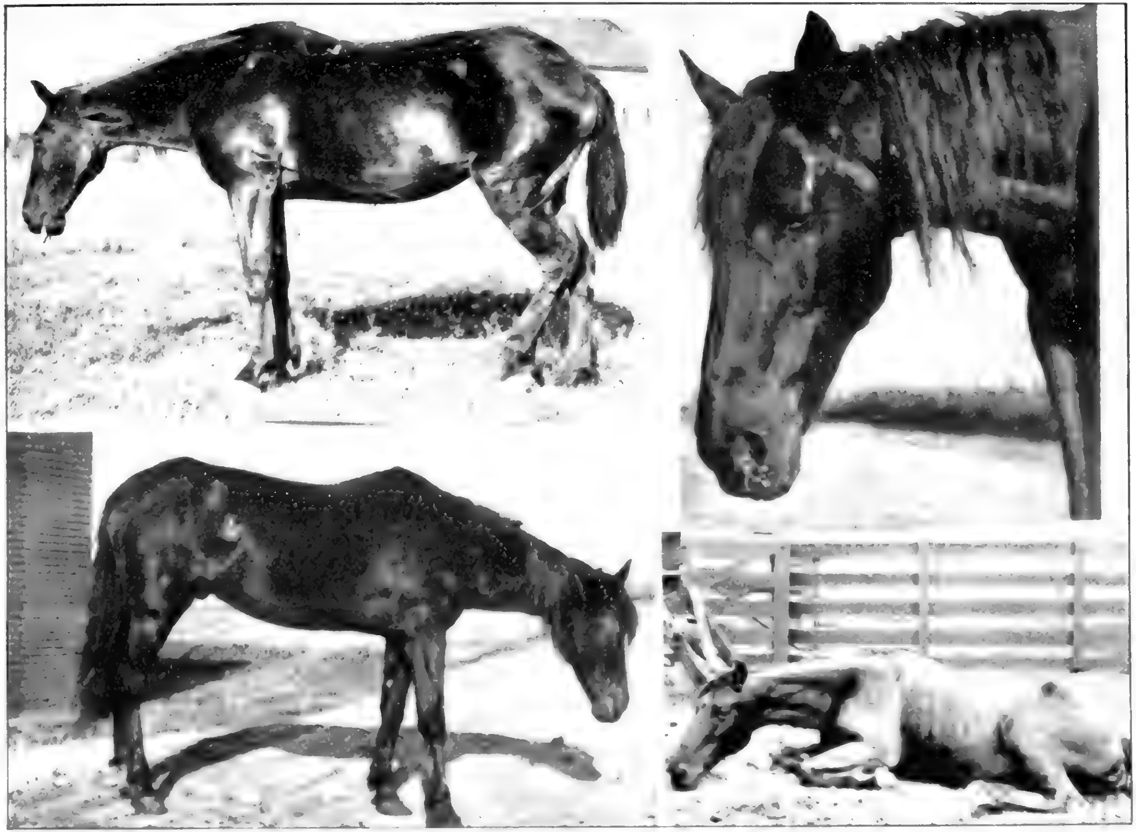
HORSE NO. 43: *Treatment*: From December 14th to 28th this animal received daily intravenous injections of active 0-1 sterile culture filtrates in Uschinsky's medium, as indicated in Chart 3.

Syndrome: Symptoms manifested subsequent to injection consisted of yawning; altered respiration; dull, languid attitude; staring expression of the eyes; difficult mastication; salivation; incoördination of the voluntary muscles; marasmus; and eventually decubitus, prostration and death. The clinical symptoms observed in several experimental horses injected with the sterile filtrate during the last few hours of life, were not unlike those observed in horses which had become fatally affected from eating the original oat forage. The initial intrajugular injection of the filtrate had a laxative effect on the bowels, while subsequent daily injections seemed to decrease peristaltic action.

Anatomic Alterations: Abrasions and bruises on head and extremities inflicted in recumbency. Congestion of the brain; gelatinous infiltrations of the muscle and fascia of the laryngeal region; catarrhal condition of the mucous membrane of the nasal passages, with a few scattered petechial hemorrhages; hypostatic congestion of left lung; thoracic lymph nodes edematous; hemorrhagic infiltration of myocardium; hemorrhages on auriculo-ventricular valves; gelatinous infiltration about coronary arteries.

Mucosa of stomach and small intestine covered with grayish catarrhal exudate. The peritoneal surface of the cecum was discolored as the result of congestion of the mucosa. Hemorrhagic

PLATE V.



Attitude displayed by horses preceding permanent decubitus as a result of daily intravenous injection of sterile filtrates of 0-1 bacillus in Uschinsky's medium.

enteritis was diffuse, with well defined submucous hemorrhages in this organ. The large colon externally appeared normal, but inversion and removal of semi-solid contents disclosed enteritic areas and submucous hemorrhages.

The gross lesions observed in this animal are of particular interest in that a toxin-like substance contained in the sterile filtrate apparently exerted a selective action on the mucosa of the cecum and colon, when introduced intrajugularly.

CHART No. 3.

Horse No. 43. Received intravenous injections of sterile culture filtrates of 0-1 in Uschinsky's medium.

Date	Time	Quanitity Material injected		Symptoms noted following injection
Dec. 14	1 p. m.	400 c.c.	4 days old	Muscular tremors; yawned; altered respiration; dull, languid attitude; muscular twitching of the lips; mild salivation.
Dec. 15	10 a. m.	400 c.c.	5 days old	Altered respiration; dull, alternating with restlessness.
Dec. 16	10 a. m.	400 c.c.	6 days old	Altered respiration; depressed but remained standing; yawned, followed in one-half hour by dull, sleepy appearance; chewing without food in mouth.
Dec. 17	10 a. m.	400 c.c.	7 days old	Uneasy following injection; chewed but did not salivate; walked unsteadily; very dull.
Dec. 18	10 a. m.	400 c.c.	8 days old	Dull, alternating with nervous attitude.
Dec. 19	10 a. m.	400 c.c.	9 days old	Masticated food freely.
Dec. 20	10 a. m.	750 c.c.	10 days old	Chewed but did not salivate; incoördination; would start eating and stop suddenly.
Dec. 21	10 a. m.	750 c.c.	11 days old	Dull; chewing; quivering in shoulder muscles and extremities; pharyngeal paresis.
Dec. 22	10 a. m.	300 c.c.	5 days old	Uneasy following injection.
Dec. 23	10 a. m.	500 c.c.	6 days old	No immediate symptoms. In about two hours salivated and trembled.
Dec. 24	10 a. m.	500 c.c.	7 days old	Salivated; muscular tremors; dull appearance; incoördination.
Dec. 26	10 a. m.	500 c.c.	8 days old	Temperature 99.3. Very weak; decubitus; very dull and quiet following injection.
Dec. 27				Decubitus; mucous discharge from both nostrils; unable to get up; masticated but swallowed with difficulty; moved feet as if running.
Dec. 28				Decubitus; nasal mucous discharge; feet as if running. Coma and death at 10 a. m.

BROTH CULTURES OF 0-1 AND N-1 ADMINISTERED PER OREM. The administration of 1,000 c.c. of 0-1 broth culture, approximately one month old, in wholesome feed, was frequently followed by a

dull, tired attitude. Incoördination and weakness of a transitory nature were noted between the seventh and thirteenth days. We were unable to continue these experiments in some instances because of the fact that many experimental horses refused feed to which 0-1 culture in this medium had been added. Horse No. 42 was given 500 c.c. 0-1 broth culture night and morning disguised in wholesome feed. During the interim of the seventh to twelfth day this horse was stupid and languid. 150 c.c. of sterile 0-1 filtrate on synthetic media were administered intravenously on the twelfth day. Following the injection the stupor was profound and muscular tremors in the region of the withers, gluteus and extremities were noted. The pronounced nervous symptoms subsided in a few hours after the injection and the animal continued to appear tired and stupid. Broth cultures were continued, in wholesome feed, though the animal ate slowly and sparingly. On the fifteenth day this horse was suddenly afflicted and evidenced a marked incoördination of the posterior extremities and became permanently recumbent. Respirations were increased, but the body temperature was quite normal until death, which was preceded by a state of coma alternating with prolonged periods of restlessness and moving of the feet as if running.

Cultures employed in feeding experiments were approximately thirty days old, and some horses were allowed a complete ration of wholesome feed after evidencing mild transitory symptoms, following which they apparently recovered.

In illustration of the effect of a six months old culture grown in ½ per cent. Liebig's beef extract (no peptone), Horse No. 71 was allowed wholesome feed, and to the drinking water from 1,000 to 2,000 c.c. N-1 culture were added each day. During the first eight days this animal appeared normal. On the ninth day the animal was decumbent, breathing naturally, but incapable of regaining a standing posture. A nervous appetite prevailed throughout the day and small quantities of hay were eaten. Hay was held in the mouth while the animal lay in a state of coma. At other times the feet were moved as if running and respirations were increased. On the tenth day the animal regained a standing position, but displayed marked incoördination and appeared dull and exhausted. On the eleventh day the animal was permanently recumbent, and death followed on the thirteenth day. During the interim between the eleventh and thirteenth days the animal re-

mained in a condition of coma, except at intervals when the feet were moved vigorously. A laxative condition of the bowels was noted during the last forty-eight hours of life.

CHART No. 4.

Horse No. 71. Received N-1 culture approximately six months old in ½% Liebig's beef extract in drinking water.

Date	Quantity	Temperature a. m.	Temperature p. m.	Symptoms
1916				
June 1	1000 c.c.	100.4	100.7	
June 2	1000 c.c.	100.2	100.6	
June 3	2000 c.c.	100.9	99.7	
June 4	2000 c.c.	100.1		
June 5	2000 c.c.	99.8	100.4	
June 6	2000 c.c.	100.3	98.5	
June 7	2000 c.c.	100.5	100.0	
June 8	2000 c.c.	99.6	99.0	Decubitus. Pharyngeal paresis.
June 9	2000 c.c.	99.4	100.1	Decubitus. Eating hay.
June 10	2000 c.c.	100.4	98.5	Standing; eating hay; incoördination
June 11	2000 c.c.	97.6	98.5	Permanent decubitus; marasmus.
June 12	2000 c.c.	100.0	100.6	Permanent decubitus; marasmus.
June 13				Death.

Anatomic Alterations: Meningeal vessels injected; lungs congested; heart mildly hemorrhagic; a few small areas of mucosa of small intestine, about 4 cm. in diameter, mesentery injected; kidneys hyperemic.

BROTH CULTURES OF 0-1 AND N-1 ADMINISTERED PER RECTUM. The refusal of certain horses to consume appreciable amounts of artificial cultures disguised in wholesome feed, prevented to an extent satisfactory feeding experiments and made rectal administration necessary. In order to determine the effect of administering 0-1 broth culture per rectum, daily enemas were administered to Horse No. 57. This animal received cultures approximately thirty days old daily for six consecutive days. On the seventh day the animal was found in a recumbent position, continuing until the tenth day when death occurred. This animal received wholesome feed during the first six days of the experiment, but while in a recumbent position but little feed and water were consumed. The body temperature as recorded from day to day indicated no appreciable alteration.

The sudden pronounced symptoms observed in this animal further suggested the poisonous properties of this bacillus to horses, as administered per rectum. Daily enemas of 0-1 broth cultures

were not attended with fatal results in all experimental horses; in fact some animals evidenced only mild transitory effects. A control horse (S. B. B.) was given daily enemas of 1,500 c.c. sterile broth for twelve consecutive days, with an approximate loss of 300 c.c. per day, without noticeable effects. In all experimental animals the quantities administered in the form of daily enemas were given in two and three doses, two to four hours apart.

Chart No. 5.

Horse No. 57. Received per rectum 0-1 on beef broth approximately one month old.

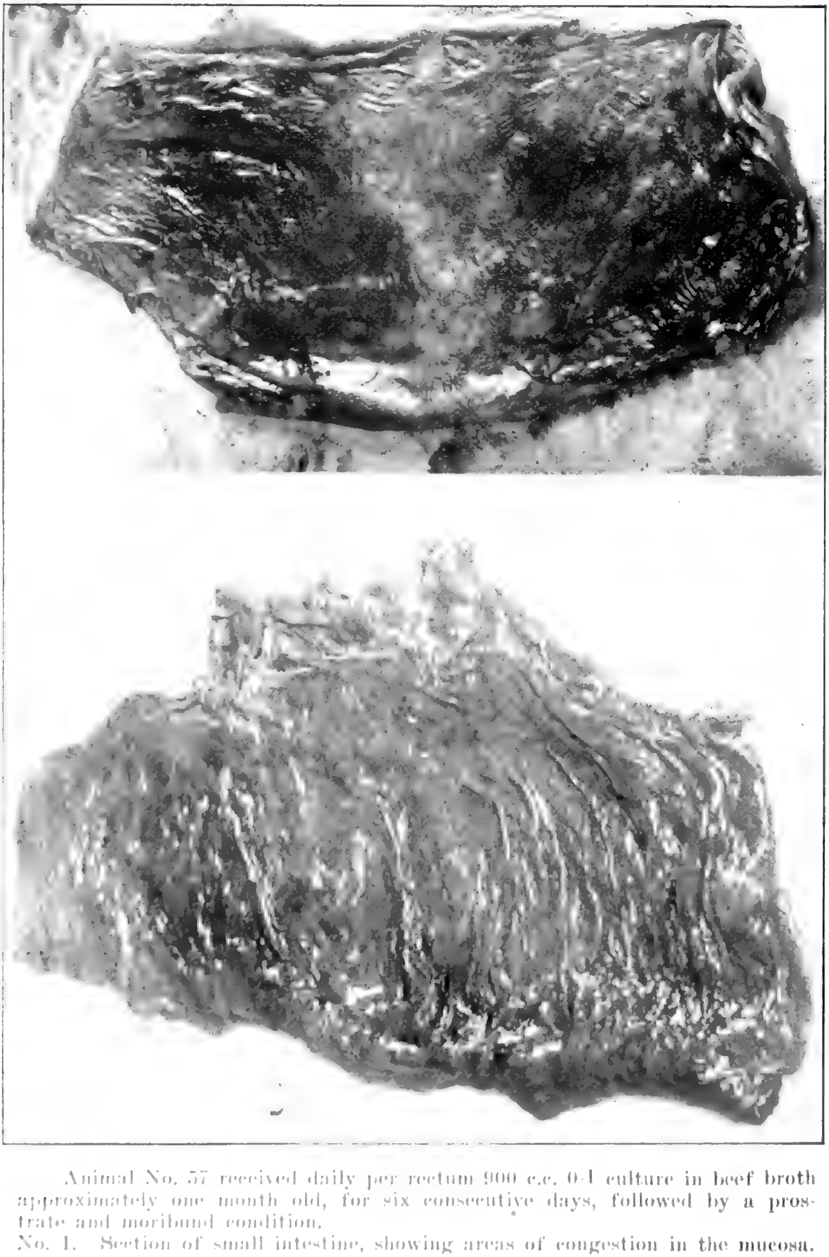
Date	Temperature a.m.	p.m.	Quantity Administered	Loss	Symptoms
1916					
Feb. 23		99.8	900 c.c.	300 c.c.	Appetite normal.
Feb. 24	99.0	98.3	900 c.c.	300 c.c.	Appetite normal.
Feb. 25	98.4	98.3	900 c.c.	300 c.c.	Appetite normal.
Feb. 26	100.7	100.0	900 c.c.	300 c.c.	Appetite normal.
Feb. 27	100.2	99.8	900 c.c.	300 c.c.	Appetite normal.
Feb. 28	99.4	98.0	900 c.c.	300 c.c.	Appetite normal.
Feb. 29	98.6	99.0	900 c.c.	300 c.c.	Decubitus. Unable to stand.
March 1	97.1	99.0	900 c.c.	300 c.c.	Ate a little hay. Decubitus. Coma.
March 2	99.4	98.1	900 c.c.	300 c.c.	Ate a little hay. Decubitus. Coma.
March 3	98.6	99.6	1800 c.c.	300 c.c.	Ate a little hay. Decubitus. Coma.
March 4	99.3	99.0	1700 c.c.	300 c.c.	Ate a little hay. Decubitus. Coma.
March 5					Died during night.

Anatomic Alterations: Meningeal vessels congested; lungs congested; a few punctate hemorrhages on the subpleural surface; hemorrhages on the heart; areas of congestion of the mucosa of cecum and colon, with submucous hemorrhages. The mucosa of small intestine was covered with a catarrhal exudate, which on being removed revealed small areas of congestion (2 to 6 cm.).

Discussion: Administration of 0-1 culture per rectum to Horse No. 57 was not accompanied by manifest symptoms until the seventh day, when the animal was found in a prostrate condition. During the first seven days the animal appeared normal. The course of death in this animal resembled, in a measure, the abrupt clinical manifestations observed subsequent to feeding the original oat hay. It is of interest that the anatomic alterations observed on autopsy were more intense in the cecum and colon, suggesting a selective action.

Similar fatal results were observed subsequent to enemas of N-1 culture grown in ½ per cent. beef extract and of N-1 culture in alfalfa decoction. Not all experimental horses succumbed as the

PLATE VI.



Animal No. 57 received daily per rectum 900 c.c. 0·1 culture in beef broth approximately one month old, for six consecutive days, followed by a prostrate and moribund condition.

No. 1. Section of small intestine, showing areas of congestion in the mucosa.

No. 2. Section of colon, showing submucous hemorrhages.

result of daily administration of 0-1 and N-1 cultures per rectum, but a stupid appearance, incoördination and mild transitory effects were frequently observed.

Sterile Filtrates in Uschinsky's Medium Administered Intravenously Subsequent to Feeding the Bacillus per Orem or Rectum. Following single injections of an active cultural filtrate in Uschinsky's medium to experimental horses, manifest nervous symptoms were frequently observed, which gradually subsided in depression.

Some of the horses that were given 0-1 and N-1 cultures in broth per orem or per rectum did not succumb, nor did they show symptoms which would prompt a continuance of the experiment. It was noted, however, that following intravenous injections of the sterile filtrates of active 0-1 and N-1 cultures in synthetic media, a condition resembling anaphylaxis often resulted in experimental horses that had previously received 0-1 and N-1 cultures in broth per orem or rectum. In some instances there was no interim between the last administration of 0-1 or N-1 broth cultures and the initial injection of the sterile filtrate. For example, in one horse the bacillus was fed for twelve consecutive days. On the twelfth day the animal received an intravenous injection of the sterile cultural filtrate on synthetic media, which was followed by death in a few minutes. Similar results were observed in Horse No. 48 after receiving the silage from which N-1 was isolated and watery extract of same to drink from December 30th, 1915, to January 10th, 1916. From January 10th to 27th this animal received wholesome feed, together with cold watery extract of the silage to drink. On January 27th, 400 c.c. N-1 sterile cultural filtrate, sixteen days old, were injected intravenously. Immediately following the injection the animal manifested muscular incoördination, fell and died in approximately ten minutes from respiratory arrest.

Similar fatal results were observed subsequent to the administration of N-1 sterile filtrate (fourteen days old) to a horse that had been fed daily per orem 750 c.c. N-1 broth cultures for a period of about thirty days, there being no interim between the feeding of the broth cultures and the intravenous injection of the sterile filtrate.

The sudden death observed following the intravenous injection of the sterile filtrates in synthetic media in horses that had previously been fed this bacillus, is suggestive of the presence of a bac-

terial protein. However, similar phenomena could not be demonstrated in guinea pigs, nor were we able to produce fatal results in horses by administering a single injection of a sterile cultural filtrate intravenously as a sensitizing dose and allowing a period of time to elapse before the second or toxic dose was given. Chemical tests of ninety day cultural filtrates by Dr. Buckner failed to reveal the presence of true protein.

The phenomena observed in our experiments resembling hypersensitiveness as the result of feeding 0-1 culture followed by the injection of an active cultural filtrate of the bacillus on synthetic media, are at variance with true anaphylaxis, as similar experiments with small laboratory animals resulted negatively, suggesting a selective anaphylactic phenomenon. The interpretation of the fatalities in horses resembling anaphylaxis is further complicated by the toxic effect produced by single injections of the sterile cultural filtrate and also by the fatal results observed from daily intravenous injections of the sterile cultural filtrates of N-1 and 0-1 in Uschinsky's medium.

Susceptibility of Small Animals. Preliminary feeding of the forage from which 0-1 was isolated suggested the non-pathogenicity to small animals of microörganic growth present on the oats. In order to determine the pathogenicity of 0-1 and N-1 cultures several methods were employed to expose these animals. The ensilage from which N-1 was isolated could not be fed to small laboratory animals and therefore its effect upon small animals could not be determined.

Small Animal Experiments. Series A. *Experiment No. 1.* Two guinea pigs were injected subcutaneously with 5 c.c. each of 0-1 sterile filtrate grown on synthetic media, daily for ten days. No harmful effect from injections was noted. The general health of the animals remained normal, with maintenance of body weight.

Experiment No. 2. To determine if animals could be sensitized to the filtrate, two guinea pigs were injected with .01 c.c. each of 0-1 filtrate on synthetic media. After ten days these animals were injected with 10 c.c. of the sterile filtrate. Following the second injection no harmful effect was noted.

Experiment No. 3. Two guinea pigs were fed for fifteen days 0-1 broth cultures. No observable symptoms resulted.

Experiment No. 4. Two guinea pigs were injected subcutaneously with 5 c.c. each of 0-1 culture grown on meat broth, with no noticeable effect.

Experiment No. 5. Two guinea pigs were injected daily for a period of ten days with .01 c.c. 0-1 sterile filtrate on Uschinsky's

medium subcutaneously. After an interval of twelve days following the final daily injection, 10 c.c. 0-1 culture filtrate on synthetic media was administered intraperitoneally. A control pig treated with the sterile medium gave no evidence of distress, while slight uneasiness which subsided in three or four minutes was observed in the pigs receiving 0-1 cultural filtrate.

The above results indicate the non-pathogenic character of 0-1 bacillus to guinea pigs.

SERIES B. *Experiment No. 1.* Two rabbits were injected intravenously with 5 c.c. each of 0-1 sterile filtrate, grown on synthetic media, daily for ten days. No symptoms manifest other than discomfort from needle puncture.

Experiment No. 2. Two rabbits received .01 c.c. each of 0-1 sterile filtrate on synthetic media, intravenously. After ten days each received 10 c.c. of 0-1 culture, intravenously. No symptoms manifest.

Experiment No. 3. Two rabbits were fed for fifteen days 0-1 broth culture. No noticeable effect resulted from feeding.

Experiment No. 4. Two rabbits were injected with 5 c.c. each of 0-1 broth culture intravenously. No noticeable effect.

The results in rabbits and guinea pigs would indicate the non-pathogenicity of this organism and its products to these animals. Similar experiments were conducted with N-1 cultures, with like results. The negative results observed in feeding the original oats from which 0-1 bacillus was isolated to guinea pigs and rabbits, are in further evidence of the non-pathogenicity of this bacillus to small animals.

SERIES C. Subcutaneous injections of 0-1 cultures were made in chickens and white rats and intravenous injections in domestic swine, with negative results. The fact that hypersensitiveness is not established by a small sensitizing dose of active cultures of 0-1 filtrate suggests that bacterial products contained in the filtrate are not of a true protein nature. The variance in technique employed by Anderson and Rosenau[12] in producing anaphylaxis with bacterial proteins suggests that it is more difficult to demonstrate this phenomenon with bacterial proteins. Holobut[13] developed a technique of sensitization with bacterial proteins which is considered more reliable than methods previously employed, consisting in the administration of several daily minute sensitizing doses, followed by a toxic dose after an interval of several days. This technique, in our experiments, was not productive of a fatal anaphylaxis. In some guinea pigs mild transitory effects were noted following the toxic dose, which subsided in about five minutes. Chemical examination of a similar filtrate used in animal experiments was made by Dr. G. D. Buckner of the Experiment Station, with negative results*, as follows: no ppt. formed on heating; Millon's re-

*The biuret test with the sterile filtrate was positive; however, this method is not accepted as an accurate indicator of the presence of true protein.

action negative; xanthoproteic reaction negative; solid $MgSo_4$, no ppt.; mineral acids, no ppt.; phospho-tungstic acid, no reaction; guinea pigs injected at intervals gave negative results for the presence of protein.

SUMMARY. During the course of experimental studies in connection with a definite outbreak of forage poisoning, wherein an oat hay proved to be quite uniformly poisonous to horses and mules, various types of microörganisms were isolated from the forage. A spore forming, Gram negative, aerobic bacillus designated in this paper as 0-1 and 0-1 culture, proved to be pathogenic as administered to horses and mules, less so for cattle, sheep and goats, while guinea pigs, rabbits and white mice were apparently immune. (A bacillus possessing characters similar to 0-1, designated in this paper as N-1 and N-1 culture, was isolated from a silage in a remote outbreak of forage poisoning among cattle.)

Small laboratory animals, guinea pigs, and rabbits, did not prove susceptible to daily injections or feeding of this bacillus, or the filtrates of same, nor were we able to produce the anaphylactic shock in these animals or manifestations of a true anaphylaxis with the sterile filtrates of 0-1 and N-1 cultures in Uschinsky's medium, further supported by negative chemical tests for the presence of true protein.

Daily intravenous injections of this bacillus, as well as daily intravenous injections of the sterile filtrates of the bacillus in Uschinsky's medium, to horses, resulted in increased respiration, partial paresis of the pharyngeal muscles and the muscles of the intestinal wall, incoördination, prostration and death. Prostration and death occurred subsequent to the daily administration of the bacillus per orem and per rectum, while other experimental horses similarly exposed over a longer period of time manifested only a transitory effect. The clinical manifestations observed in some experimental horses as the result of daily intravenous injections, rarely subsequent to feeding per orem and rectum of this bacillus, and more constantly following the daily intravenous administration of sterile cultural filtrates in Uschinsky's medium, presented a striking resemblance to the symptoms evidenced by horses at the time of and subsequent to prostration, as a result of eating the oat hay. Comparison of symptoms in forage poisoning are not exact and must be accepted with limitations, as the clinical manifestations observed in this disease are not constant in character, though such nervous derangements as pharyngeal incoördination, paresis

of the bowels, prostration and permanent decubitus, together with gross anatomic alterations as observed on autopsy in some experimental horses, are suggestive.

Sudden death resembling anaphylaxis subsequent to intravenous injections of the sterile filtrates in horses that had previously been apparently sensitized by feeding the bacillus per orem and per rectum, and in one instance by feeding the forage from which the bacillus was isolated, suggested the occurrence of a hypersensitive-like condition as the result of ingestion. In this connection hypersensitive animals might suffer fatal intoxication as a result of abrasions in the enteron or other factors which would tend to promote rapid absorption. The hypersensitive-like condition observed in horses is suggestive of a selective action not applicable to small animals, yet the poisonous character of the filtrate per se for horses is not disregarded in this connection, as indicated by a single intravenous injection in horses, and by a possible cumulative or "ascending like effect" from daily injections, terminating in incoördination and death. It is contributive to our knowledge of this outbreak that sterile filtrates of the bacillus described herein, subsequent to daily intravenous injections in some experimental horses, proved pathogenic and capable of exciting clinical manifestations somewhat analogous to affected animals in the original outbreak as the result of feeding on the oat hay.

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LOCAL ANESTHESIA IN ANIMAL DENTISTRY*

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For some time it has been the thought of the author of this paper that some improvement in methods used in animal dentistry would be welcomed by members of the veterinary profession and therefore I beg your consideration of the contents of this paper as one step in that direction. We do not claim any originality in this method as it has been used for some time in human dentistry but to my knowledge has never before been adapted to animal dentistry.

The method used is really that of "nerve blocking" or conductive anesthesia of either the entire infra-orbital nerve or the mandibular alveolar nerve as may be desired. The infra-orbital nerve gives off alveolar or dental branches. The posterior branches pass through small foramina in the tuber maxillare and supply the posterior molar teeth and maxillary sinus. The middle branches are given off in the infra-orbital canal, and constitute the chief nerve supply to the cheek, teeth and the maxillary sinus. The anterior branches supply the canine and incisor teeth. The dental branches of the mandibular nerve are detached from the nerve within the mandible and are arranged like the corresponding nerves of the upper jaw.—(Sisson.) The benefits to be derived from such a method are obvious. The animal is relieved of the excruciating pain occasioned by dental operations upon any of the teeth and is at the same time conscious. The danger of inhalation of blood and purulent material is therefore reduced to a minimum. The operator, on the other hand, is relieved of the necessity of constantly administering or watching a general anesthetic which at best is very difficult of administration during dental operations.

The anesthetic used by us has been alypin in 5% solutions. Alypin is a synthetic product, a derivative of the benzoyl group which occurs in the form of a white crystalline powder readily soluble in water, sterilizable by boiling and apparently nontoxic for horses in reasonable doses. We have injected as much as 10 c.c. of a 10% solution in an average sized horse without visible toxic effects. The alypin should be dissolved in Ringer's solution,

*Presented at the meeting of the A.V.M.A., Detroit, Mich., Aug. 21-25, 1916.

a sterile normal salt solution made from distilled water and containing a trace of calcium chloride as follows:

Sodium chloride	0.5
Calcium chloride	0.04
Potassium chloride	0.02
Aqua destillata	100.

According to Fischer the normal salt solution inflicts the least possible injury upon the tissues and the calcium salt adds to its penetrating powers. To prolong the action of the anesthetic add a few drops of adrenalin chloride 1-1000.

The animal may be controlled in stocks in the standing posi-

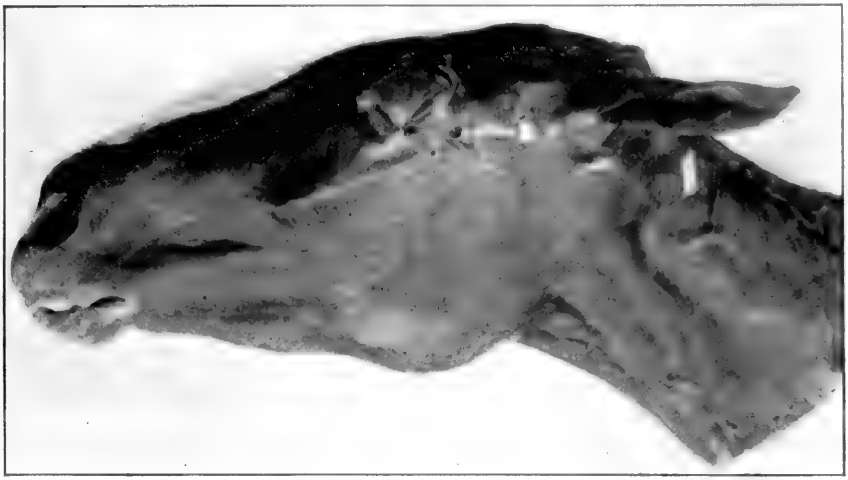

FIG. 1. Showing points of injection near the eye and posterior to the mandible under the ear.

tion while the injection is being made, but thorough control upon the table or upon the ground is much to be preferred as there is danger of breaking the needle. Furthermore, dental operations for which anesthesia is necessary, should be performed only after the animal has been thoroughly controlled so as to minimize the danger of fracture of the teeth or jaws.

The object of the operation is to inject directly upon the infra-orbital nerve or the mandibular alveolar nerve as the case may be, a sufficient amount of anesthetic to "block" the sensation of these nerves at the points where they enter respectively, the maxillary foramen and mandibular foramen. For this pur-

pose it is necessary to be provided with a hypodermic syringe and a No. 20 guage needle about 10 c.m. in length.

For injection of the infra-orbital nerve, select a point on the side of the face opposite the lateral canthus of eye and just inferior to the facial crest, being careful to keep above the transverse facial vessels. The field being carefully shaved and sterilized with tincture of iodine, penetrate the skin with the sterilized needle, keeping the point directed upward and forward so that it will follow the posterior border of the zygomatic process and drop

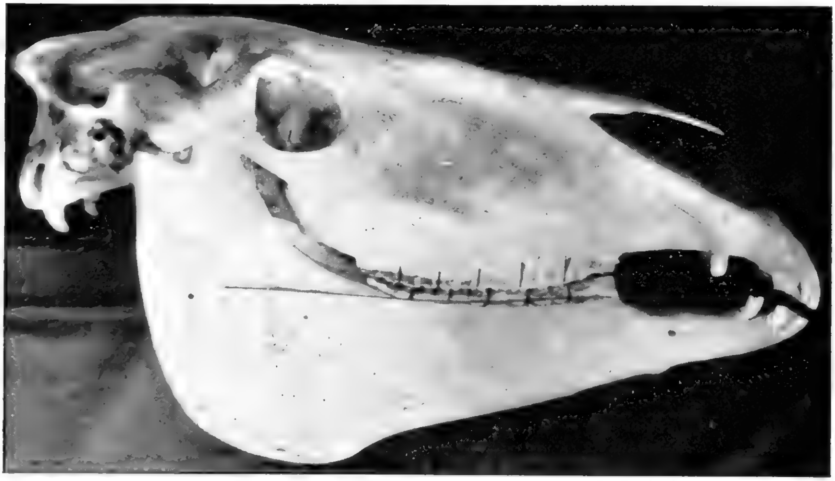

FIG. 2. External aspect of mandible. Intersection of lines to locate mandibular foramen.

into the pterygo-palatine fossa just posterior to the tuber maxillare. Push the needle in until it strikes the perpendicular portion of the palatine bone in the region of the maxillary foramen, a distance of 6.5 to 7.5 cm., depending upon the size of the animal. Following this technique, it is possible to avoid puncture of the vena reflexa which lies just posterior to the point of injection. Having placed the needle, inject 4 to 5 c.c. of 5% solution of alypin prepared as above. Withdraw the needle slightly as the injection proceeds. Anesthesia should be established after ten to twelve minutes and should last twenty to thirty minutes after being established.

The injection of the mandibular alveolar nerve is a more difficult matter. Possibly a better technique may be devised later.

The mandibular foramen lies practically opposite the point of intersection of a line dropped from the center of the supra-orbital process to meet a line extended backward from the tables of the mandibular teeth. These structures can be palpated from the outside and the approximate location of the foramen determined for the guidance of the needle in direction and depth. To reach the nerve after our present method, select a point on the posterior

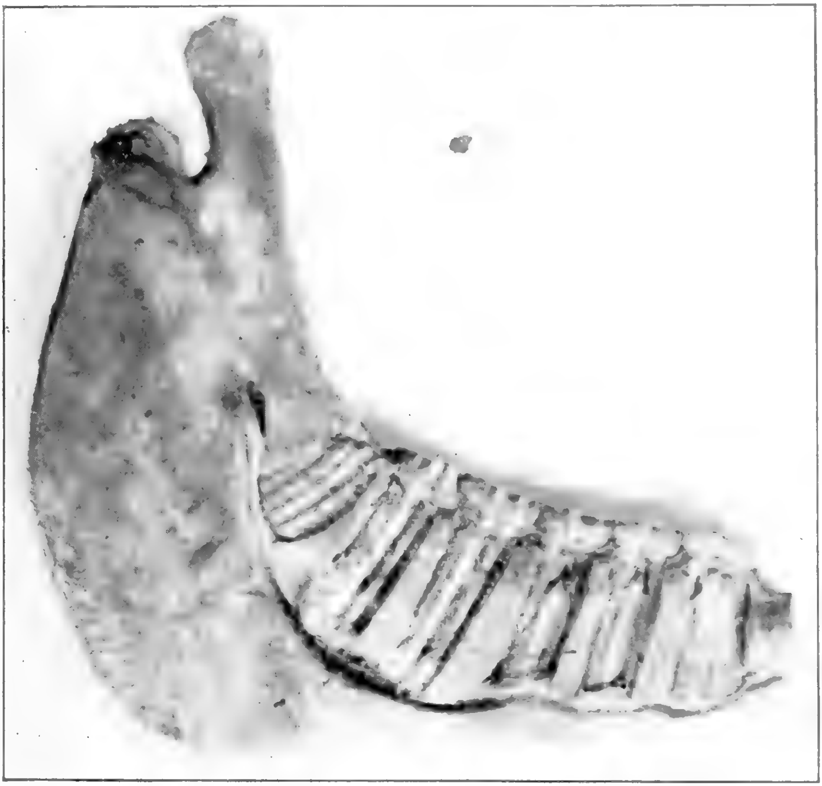

FIG. 3. Inner aspect of mandible showing nerve and its relation to teeth.

border of the mandible about 3 cm. below the temporo-maxillary articulation.

After thorough preparation, penetrate the skin at this point and allow the needle to lie in the depression between the wing of the atlas and the base of the ear. Depress the point of the needle until it passes by the inner border of the mandible. Advance the needle to a depth of 7 to 8 cm. in the direction already given it,

keeping the point as close as possible to the inner surface of the mandible, but as the nerve lies medial to the accompanying artery and vein, the needle does not need to follow the bone closely. Following this method, the needle should parallel the nerve for a distance of 3 to 4 cm. Distribute 4 to 6 c.c. of a 5% solution of alypin along this length and a good anesthesia should result.

This method was first adapted by us to animal dentistry in the spring of 1915 and reported in September of the same year. It has been used during the year upon about ten clinical cases and a larger number of experimental cases. In a few cases the results have not been entirely satisfactory but most cases have shown unmistakable signs of relief from pain and some have shown remarkable results even giving no reaction to the blows of mallet and punch during repulsion. The method has been reported upon favorably by Dr. L. A. Merillat of Chicago and Dr. A. J. Treman of Lake City, Iowa.

The method will be of the greatest value only if it can be made successful in the hands of the practitioner and come into general use. We hope that the description of the technique when accompanied by the cuts which will appear with the publication of the article, will lead many to try its value and report later.

The author wishes to acknowledge the helpful suggestions of Dr. H. S. Murphey and the work of student assistants Max McLeod and G. W. McNutt.

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DISCUSSION

DR. MERILLAT: The use of an anesthetic on the dental nerves in animals is entirely new, and was first done by Dr. Bemis. I had a great deal of correspondence about this procedure, and I have not yet found any one who has ever heard of nerve blocking in animal dentistry before. This operation, I think, has proven its feasibility as well as its effectiveness in doing what it is intended to do. A few weeks ago I had occasion to apply it in two cases before the students of the University of Saskatchewan. One operation required the chiseling of the anterior part of the mandible

to remove a sequestrum, and every one present conceded that the animal suffered absolutely no pain. The chiseling proceeded with the patient lying out, and there was no evidence at all in the movements of the patient that it was suffering in the least. This seems a very remarkable procedure, something that should be universally adopted by veterinarians who practice surgery.

AN EXPERIENCE WITH DIFFERENT TREATMENTS FOR "SHIPPING FEVER" IN A SALES STABLE*

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Although the term "Shipping Fever" is a comprehensive one for such contagions as, influenza, strangles, or distemper, contagious pneumonia, etc., I employ it because it adequately expresses conditions existing in sales stables, being by custom applied to any of a number of illnesses which may develop in horses after being shipped. So many difficulties arise in connection with the differential diagnosis of these several febrile diseases in sales stable work, that we not only come to regard them all in a general way, under the term "shipping fever", but our treatment likewise is apt to become somewhat routine. Only to a limited extent can we expect to treat the individual, and the veterinarian who undertakes sales stable or similar work, has a somewhat different situation to face than that met by most veterinarians. It is therefore quite possible that some treatment which in my hands was of little value, may have given you good results. It is because of the very general manner in which the situation is viewed, that the dealer and the veterinarian, as well, are constantly on the lookout for something with merit, a panacea, that is, which will apply to all cases, and because of the losses sustained in spite of all recommended treatments, will, like a drowning man, clutch at a straw. This is why so many different treatments have been tried only to be discarded. It is not the purpose of this paper to discuss the etiology of influenza, contagious pneumonia, strangles, etc., but to bring to your attention the results of my findings, as to the relative value of different medicaments, sera, bacterins, etc. used by myself during a

*Presented at the meeting of the Pennsylvania State Veterinary Medical Association, January 23-24, 1917.

period of about ten years, at one of the large sales stables in Philadelphia.

I will first call your attention to *Tallianine*:—Hundreds of cases were treated with it. The results were not satisfactory.

Nuclein, or *Nucleinic Acid Solution*:—This at one time I bought, I might say, by the *quart*, using it intravenously, intramuscularly and subcutaneously with no ill effects, but at the same time *with no marked improvement* in the individuals receiving the injection. It is recommended chiefly to produce leucocytosis, but for this purpose I prefer olive oil and camphor.

"Influenza Antitoxin", so called, at about $1.50 per ounce, was given a fair and impartial trial, regardless of the price. The amazing results reported from this, from antistreptococcic serum, and from the other "anti-sera", procured from horses recovered from influenza, with and without pneumonic complications, have not been confirmed by me. An epitome of my experience along these lines is as follows:—I have repeatedly bled normal horses, those recently recovered from influenza and pneumonia, and those in which an attempt had been made to produce a hyperimmunized serum, and have used such serum alone, or combined with .5% carbolic acid or trikresol, in from 10 c.c. to 400 c.c. dosage. Antistreptococcic serum was also used in from one to three ounces at each injection and on many cases, because I certainly expected much of it in the treatment of strangles. My conclusion is that sera have very little value in from 10 c.c. to 60 c.c. dosage when employed in treating horses already sick. However, in that it is assumed that animals recovered from pneumonia, influenza, etc., have acquired an immunity, for a time at least, and their blood contains anti-bodies, their serum should therefore possess immunizing properties. Never having used such "sera" in a prophylactic sense I am unable to draw from my experience, but in conversation with some veterinarians, am led to believe, that one to two ounces of such a serum may be of value in this connection. In a curative sense, however, I feel that one ounce does not begin to be sufficient. Take for example, a horse weighing approximately 1500 pounds; one-fifteenth of his body weight, (100 lbs. or 50 quarts), is blood. It is reasonable to suppose that the blood of such an animal, when presenting most of the symptoms of influenza, would contain the morbific agent in large amount, and it is ridiculous to suppose that one ounce of an anti-serum would be sufficient to neutralize about

fifty (50) quarts of virus laden blood. The cost of treatment with such purchased sera I found was therefore almost prohibitive. After the injection of about 250 c.c. of serum, procured from even acclimated horses (ambulance horses), although after such injection there was no appreciable fall in the temperature, the condition of the influenza patients appeared improved. The pneumonic cases and those with the enteric form of influenza did not, however, show any improvement. The improvement appeared to be more apparent when the serum was combined with carbolic acid than when used alone. The large amounts of serum necessary to bring about improvement in the animal, the time consumed in the preparation of the serum, the cost of purchased serum, the possibility that the improvement was due to other treatment the animals received, etc. led me to discontinue my experiments along these lines.

I will next refer to my experience with bacterins or vaccines. Have used the recommended products of most of the biological houses, practised autogenous vaccination, carried out the Duncan idea of auto-therapy, etc. on animals already ill, with disappointing results. My attempts to immunize animals against the so-called "secondary invaders" was not fruitful of results. Have gone so far as to have had horses injected before loading on cars to be shipped East. Of course, I realize that it would be impossible to say that such animals had not previously been exposed to infection, inasmuch as they were purchased at one of the shipping centers. For the treatment of influenza a proper bacterin is not available because the etiological factor is not known. Even if a specific organism was isolated, I am inclined to think that a bacterin made from it would be of doubtful value, because from my clinical experience with bacterins I am led to believe that they should not be employed in acute febrile conditions, because I feel that a bacterin might be said to function somewhat as a blister, that is, just as a blister is employed to light up a chronic inflammation and make it an acute one, just so with a bacterin, and if used in an acute condition will add fuel to the fire. I also believe that in sub-acute and chronic conditions it is bad practice to inject a bacterin more than once in every four or five days, if the so-called "negative phase" develops after its injection, and also that if a bacterin is injected for several days consecutively, and no reaction is set up, that the bacterin cannot contain the organism re-

sponsible for the disease, and its employment in this fashion, may, I believe, set up a proteid poisoning. I recall one instance in which I am convinced death resulted from this cause. Somewhat in contradiction, however, I have on a few occasions used phylacogens with what seemed to me a beneficial effect. These were protracted pneumonic cases and but one dose was employed in each instance.

Mallein in 10 c.c. dosage was used on three different carloads of horses because I was informed that horses receiving it, because of some state regulation, appeared to develop influenza only in a mild form. The first carload were injected immediately after unloading. Four horses of this load were unsold and remained at the sales stable until the following sales day, one week later. These four were therefore observed for ten days and did not during that time show any symptoms. The balance of the load having been sold about three days after unloading, it was impossible to say whether they became ill or not, but we assume that none died, otherwise the management would have been so informed. The second load received the mallein before they were loaded to be shipped East. Twelve horses of this load remained in apparent good health for at least three weeks after they were sold. This I was able to ascertain because the horses were sold to one firm in the immediate vicinity of the sales stable. The third load received the mallein before loading and when unloaded the temperatures were all normal except three, one of which had a temperature of 102.5°, one 104° and the other 105°. These three subsequently presented influenza symptoms. They all recovered, however, with no complications.

Next *salvarsan* was most gratefully welcomed not only because it was claimed to be a specific for contagious pneumonia, but also because it is said that salvarsan in watery solutions, possesses a distinct bactericidal power, and in ordinary doses renders the blood markedly bactericidal. I therefore used it, I admit, somewhat promiscuously not only on two cases of pneumonia but also on one case of purpura, one of strangles and three of influenza with the following results: The pneumonia and purpura cases died. The strangles and influenza cases recovered but their recovery was slow, and the animals seemed to lose considerable weight in each instance. This loss was particularly apparent in one of the influenza cases in which a second injection had been made. This case was one of two horses selected because of their similarity in weight, conformation and symptoms of influenza presented. One was used

as a control. Both recovered but the one receiving a dose of salvarsan and then a few days later a second dose, became emaciated, abdomen was tucked up, skin inelastic, etc., and was not in condition to sell for two months and even then sold at a loss, whereas the control was in good selling condition in about three weeks time. The salvarsan experiments were discontinued for several reasons: First, because of the cost; second, I learned that the bactericidal power acquired by the serum after intravenous injections of salvarsan lasts but a short time and seems to reach its maximum about one hour after its administration; third, learned that it was only recommended in the treatment of contagious pneumonia: fourth, the possibilities of its contra-indication in horses that may have been fed arsenic for fattening for market. Have used the iodin treatment as advocated by a French veterinarian, that is one (1) dram of iodin crystals in capsule, every three (3) hours, without result. Have employed, with no benefit, such agents as argyrol, protargol, pyoktanin, carbolic acid, creosote, etc. injected intravenously.

Time will not permit me to give my experience with all of the different drugs and combinations of drugs tried from time to time. The so-called "shipping fever" remedies to be used in a general way and recommended and sold as specifics to the management were also tried. Have tried out the recommended "shipping fever" prescriptions of some veterinarians, such prescriptions usually containing antipyretics in combination with stimulants. Have also practised homeopathy. Suffice it to say that such general treatment could not be expected to produce the desired results and whenever it was possible to treat the individual case, the results were vastly superior and the procedure was somewhat as follows: in those cases in which the disease is ushered in by a severe chill, if the patient is seen early enough, large doses of alcohol, spirits of camphor, nitrous ether and potassium nitrate are administered for the relief of the rigor, to increase the action of the skin and kidneys and to quiet the circulation, preventing internal congestion of vital organs. As a rule, however, the patient is not seen during this early period but during the febrile stage. Acetanilid is frequently employed as an antipyretic by veterinarians but often combined with heart stimulants because it is assumed that acetanilid has a depressant action on the heart. Such combinations as acetanilid and digitalis with this idea in mind are ridiculous, how-

ever, because the effect of acetanilid is almost immediate, whereas digitalis will not act for twelve to twenty-four hours. I have not found that acetanilid depresses the heart and consider it the best antipyretic we have, but its value is limited in these several contagions of the horse. It is not the elevated temperature that causes one worry, but the congestion does. A temperature of 105 to 106 degrees Fahrenheit is not distinctly dangerous but it is the continuation of this temperature which is harmful. The mere existence of a high temperature is not to be regarded as a condition to be overcome by drugs. If the fever becomes excessive and prolonged so that there is danger of the patient suffering from a true hyperpyrexia, an antifebrifuge like acetanilid is indicated, but I am inclined to think it is even better to resort to cool sponging.

The condition of passive congestion which develops in some cases, calls for an exercise of the therapeutic measures that will not add to the already exhausted condition of the patient, therefore, any measure of a depleting character I have found to be distinctly harmful. Bleeding, in pulmonary congestion, should not be resorted to except in certain individuals, as it will increase the exhaustion. I have found aconite a useful remedy in acute congestion. Counter-irritants in pulmonary congestion I have found to be of value only in the first twelve hours, harmful after.

A marked depression, often followed by collapse, frequently develops, associated with a pulse that is very rapid, running, feeble and easily compressed. Digitalis would now seem to be indicated, but in my experience with it, it did not seem to take hold of the circulatory apparatus, and act upon it as it should. I have found strychnine infinitely preferable, in large repeated doses. This should be given hypodermatically and if collapse is imminent, by the mouth also. Sometimes the blood vessels are so atonic that a combination of strychnine and belladonna or atropine is of marked value as a vaso-motor stimulant. The diarrhea which sets in in some cases and is sometimes referred to as a symptom of the enteric form of influenza, I believe to be a symptom of collapse; the nervous system being shattered, a vasomotor paralysis is the result, the blood vessels of the intestines are relaxed and leaking. This is a very serious condition and I have used all antidiarrhea remedies, with absolutely no effect. Atropine and strychnine gave the best results. The intravenous injection of normal saline solution with the idea of supplying the liquid lost and preventing embarrassment

of the heart, I found was of value only when there was no congestion of the conjunctiva and decidedly harmful when so employed. Large doses of strychnine are not to be used continuously, but only for a few days, at the psychological moment, so to speak, as a whip to the nervous system. The patient should be carefully watched and the strychnine discontinued, otherwise the over-whipped system may fag out.

I feel that, in a sense, it is well to regard these adynamic diseases of the horse as toxico-septicemias and we should, therefore, aim to raise the resistance of the animal thus preventing complications, guard against the waste and destruction of tissue, aid in the elimination of toxins, support the exhausted septic heart, promote leucocytosis, supply force to an exhausted system, etc. With this in mind, up until about a year ago, I made use of the following, with better results than with any line of treatment previously used. Unfortunately the prohibitive war prices made a discontinuance necessary. Alcohol in from two to four ounces diluted, was administered every three to four hours, not only to quiet, by stimulation, the nervous and circulatory systems but chiefly as a temporary imparter of power, to prevent the destruction of tissue by being itself converted into heat and force, to maintain the general nutrition and strength of the patient through the crisis. Codliver oil and creosote, or preferably guaiacol, fifteen minims of creosote or one dram of guaiacol to the ounce of oil, one to two ounces as the dose every three or four hours, were employed. Codliver oil combines the virtues of both a food and a medicine. It is generally recognized that codliver oil is useful in all conditions of low nutrition with wasting. It undoubtedly raises an animal's resistance and certainly must have some influence on the constitution of the blood. It has been asserted that codliver oil contains alkaloids which are stimulants to the circulation and nutrition, also the kidneys. Creosote is employed, chiefly with the idea of arresting the development of microorganisms, and is of value as a germicide, as a stimulant expectorant, and may also do good by preventing intestinal fermentation, checking the cough, etc. I have also had some very gratifying results with the camphor and olive oil treatment. These agents are injected subcutaneously, preferably, over the anterior pectoral muscles in from four to eight ounces of a mixture consisting of one dram of camphor to four of olive oil. Some difficulty may be experienced in causing the camphor to

be dissolved in this quantity of oil but if the oil and camphor are combined and permitted to stand for some twelve to twenty-four hours, the camphor will usually be dissolved.

In writing this paper I have endeavored to confine myself strictly to what is implied by the title, not only with the idea of presenting a practical paper but also in the hope that others may profit by my experiences.

DESICCATED ANTHRAX ANTIGEN FOR IMMUNIZATION PURPOSES

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Pasteur's anthrax vaccine has been used, wherever anthrax has prevailed, since it was first brought to the attention of the veterinary profession, although it has long been known to be an exceedingly unstable and unreliable product. According to Washburn. (Farmer's Bulletin No. 784, United States Department of Agriculture), "In the Pasteur method of vaccination there are, however, disadvantages which must be duly considered. To obtain satisfactory results from the use of Pasteur's vaccine it is of primary importance that the product be active. Experience has proved that this type of vaccine, if subjected to unfavorable conditions, may deteriorate within a short time after its preparation. Since the enactment of legislation giving the United States Department of Agriculture control of the manufacture of veterinary biological products going into interstate trade, periodical tests have been conducted with anthrax vaccine prepared by various manufacturers, and in many instances the vaccine proved inert within 3 months of its preparation. In other cases it remained potent for a year. When exposed to warm temperature and light it deteriorates very rapidly, and when it is remembered that the products of manufacturers may be stored under unfavorable conditions in branch houses and in rural drug stores, the loss of value can be readily explained."

It seems to be requisite, for the successful vaccination of animals against anthrax, to artificially produce a slight attack of the disease. This procedure raises the resistance of the tissues of the animal sufficient to prevent the live virulent microorganisms from

finding lodgment and thus producing the disease in the natural way. The organisms in Pasteur's vaccine do not remain in a sufficiently virulent condition, as a rule, to produce this artificial immunity, so that investigators, realizing this fact, have endeavored to devise other methods of preparing the antigen for vaccine purposes. The very fact that the anthrax bacillus is a spore-bearing organism very readily lends itself to the solution of the problem, as it is known that the spores at times retain their virulence for years under circumstances that would prove detrimental to organisms in the non-spore or vegetative stage, such as Pasteur's vaccine. Experiments have shown also that when the anthrax organism is acted upon by the proper amount of heat it gradually loses its virulence and, thus attenuated, will retain its modified strength in the spore stage. The method that is employed for this attenuation is that first proposed by Pasteur and used for his vaccine. A broth culture of the anthrax bacillus is allowed to grow under the influence of a temperature of 42.5°C. and, at varying intervals, is tested for virulence on rabbits, guinea pigs and white mice. A suspension of the organism just virulent enough to kill a white mouse but not a guinea pig is designated as vaccine No. 1 and one that will kill a guinea pig but not a rabbit is vaccine No. 2. With this method of procedure it is a very simple matter to standardize a spore vaccine to any strength.

According to Eichhorn, (Bulletin No. 340, United States Department of Agriculture), Zenkowsky in Russia, Detre in Hungary, Nitta in Japan and others, have had successful results with spore vaccines, and for that reason and also as a result of experiments carried on by the U. S. Bureau of Animal Industry, a spore vaccine has been proposed by them to replace, in this country, the Pasteur vaccine, using for the spore vaccine the same standardization tests as for Pasteur's vaccine. In the preparation of this spore vaccine the following method is given by Eichhorn: "For the purpose of producing a spore vaccine it is desirable to use a peptone-free agar media and after inoculation with the attenuated culture to grow the organism at a temperature of 37.5°C. for 4 to 7 days by which time an abundance of spores will have formed. The growth is then washed from the slants and collected in a sterile flask and heated to a temperature of 60°C. for one-half hour, to destroy the vegetation forms of the organism. A measured quantity of this suspension can then be plated out in the usual manner and

the spore control of 1 c.c. of the suspension be established." He also says, "In consideration of the keeping qualities of the spore vaccine, large lots can be prepared without fear of deterioration. In the bottling and storing of the same, however, proper care should be taken to prevent contamination."

In preparing material of an antigenic nature, especially for vaccine purposes, experience has taught us that deterioration due to light, heat, chemical action, autolysis, bacterial contamination and other conditions, is a factor with which one must constantly contend, and a factor best controlled by refrigeration. For therapeutic immunization on a practical basis, however, refrigeration is out of the question, and desiccation has of late proven a satisfactory substitute.

While the spore vaccine in suspension used in Russia, Hungary and Japan and advised in this country by Eichhorn and others has a distinct advantage over Pasteur's vaccine, it also has its faults, and it is very evident that the ideal vaccine would be a spore vaccine in a desiccated form. This sort of a vaccine would embody all of the advantages of both the spore vaccine and Pasteur's vaccine. With this thought in mind experiments were undertaken by the author to determine, if possible, the practicability of a vaccine.

The desiccated spore vaccine in question was prepared in a similar manner to the spore vaccine in suspension, with the exception that the growth of the anthrax bacillus was scraped off the agar, incorporated with a sterile diluent in a proportion suitable to fulfill the tests required for its standardization, and dried at room temperature.

This vaccine was first tested in the early part of last year and upon repeating the tests one year later, with the same vaccine which had, in the meantime, been kept at room temperature, it was found that there was no deterioration in its virulence. This showed conclusively that it is not even necessary to keep the desiccated vaccine at refrigerator temperature as is advised for the ordinary spore vaccine in suspension.

There is also a question of vital importance to owners of cattle, especially when the animals are raised in large numbers, relative to the form in which the desiccated material is presented and the way in which it is to be administered. This is an extremely practical question and upon which rests, in a large measure, the usefulness of the vaccine. If it is made necessary to dissolve this dried

vaccine in water before it can be injected, the method will have defeated its own purpose. To round up several hundred head of cattle, many of them in a wild state, with the intention of injecting them with a liquid vaccine by means of a syringe and a frail needle, is a difficult task. This is recognized as a great disadvantage to Pasteur's vaccine and the spore vaccine in liquid form, which is being used at present. The spore vaccine, should not only be desiccated, but it should be so prepared and standardized that it can be injected in the dry state in proper and safe proportions. This can readily be accomplished by moulding the dry spore vaccine into either the pellet or thread form, preferably the pellet, which insures the most convenient and the safest method for handling and injecting.

A STUDY OF THE FERMENTING PROPERTIES OF *BACT. PULLORUM* (RETTGER) AND *BACT. SANGUINARIUM* (MOORE)

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The organisms *Bact. pullorum* and *Bact. sanguinarium* are the causes of two important, closely allied diseases of fowls. Recent work on the relation of these organisms seems to indicate that they are closely allied species if not identical.

This investigation has been attempted in order to determine the action of the organisms on the various carbohydrates. Titrations were made at various intervals of time extending over a period of thirty days.

The following biological characters of these two organisms have been described:

BACT. PULLORUM	*BACT. SANGUINARIUM*
Morphology. Non motile rods with slightly rounded ends. 1–3.5 microns by .3–.5 microns. Marked Brownian movement.	Non motile rods with slightly rounded ends. 1–2 microns long. Marked Brownian movement.
Staining characters. Stain readily with ordinary bacterial stains. Gram-negative, uniform stain. No spores.	Stain readily with ordinary bacterial stains. Gram-negative, peripheral stain. No spores.

Agar plate. Raised shiny convex greyish white colonies 1–2 m.m. in diameter at end of 48 hours.	Raised, shiny, convex, greyish white colonies. 5–8 mm. in diameter at end of 48 hours.
Agar slant. Moderate raised dull granular growth.	Abundant, raised, shiny smooth growth.
Gelatin. Finely granular growth along line of stab. Does not spread markedly on the surface. Media not liquefied.	Finely granular growth along line of stab. Does not spread markedly on surface. Media not liquefied.
Potato. Very slight or no growth.	Growth more marked.
Milk. Slight acidity. No coagulation or precipitation of casein.	Gradually increasing alkalinity and finally saponification of the media.
Litmus milk. Slight acidity. No coagulation.	Alkalinity. No saponification.
Dextrose and mannite bouillon. Acid and gas or acid and no gas.	Acid and no gas.
Lactose and saccharose bouillon. Slight alkalinity.	Slight alkalinity.
Maltose bouillon. No change.	Acidified.

Toxin production is identical and differences in *immunological reactions* have not been found. (Smith and Ten Broeck).

Material. The strains of *Bact. pullorum* were obtained as follows:—No. 1 was isolated in 1913. No. 2 was isolated in 1911. Nos. 3 and 4 were recently isolated from chicks received in this laboratory for diagnosis. No. 5 is an atypical strain isolated in 1911.

The strains of *Bact. sanguinarium* were obtained as follows:—No. 1, known as Bact. Fowl Typhoid III, and No. 2, known as Bact. Fowl Typhoid IV, were obtained from Dr. Theobald Smith. No. 3 was obtained from Dr. Taylor.

Methods. Beef broth was made sugar free by the action of *B. coli.* To this was added 1% peptone and .5% NaCl. The carbohydrates were added in quantities sufficient to make 1%.

To determine gas production Smith's fermentation tubes were used. For acid production ordinary test tubes were employed.

The titrations were made by N–20 solutions of NaOH and HCl respectively, phenolphthalein being used as an indicator.

In the accompanying tables, the figures indicate the number of cubic centimeters of N–20 NaOH used to neutralize 5 c.c. of the media. A minus sign preceding the number indicates the number of c.c. of N–20 HCl used to neutralize 5 c.c. of the media. The

column marked *check* indicates the reaction of the media after 2 days' incubation previous to inoculation. The tubes were titrated in duplicates in each case.

The gas production was determined in four fermentation tubes of each carbohydrate and the average amount of gas recorded.

The action of the various strains of the organisms were uniform in the different carbohydrates with the exception of amygdalin. In this case *Bact. sanguinarium* strains 1 and 2 were inoculated into a different supply of the media than the other strains.

This latter medium turned to a greenish tinge after sterilization and the amount of acid produced was very small as compared with the other strains of bacteria. In order to check these results, this medium was inoculated with the other strains of the organisms and the results obtained were identical with those of *Bact. sanguinarium* 1 and 2. These latter strains were inoculated into a few tubes of the original medium, with results similar to those of the other strains of organisms on this medium.

Bact. pullorum 5 is an atypical strain which did not produce gas in any of the carbohydrates used. It is in this respect similar to the original Rettger strain. The other strains of *Bact. pullorum* produced gas and marked acidity in dextrose, mannite, galactose, levulose, arabinose and mannose. In these carbohydrates all the strains of *Bact. sanguinarium*, studied, produced marked acidity and no gas. In isodulcite the first four strains of *Bact. pullorum* produced gas and marked acidity while *Bact. sanguinarium* produced only slight acidity at first, the amount of acidity gradually increasing on prolonged incubation.

In dulcite the strains of *Bact. sanguinarium* produced marked acidity and no gas while the first four strains of *Bact. pullorum* produced slight acidity and gradually turned alkaline on prolonged incubation.

In dextrin results similar to those in dulcite were obtained except that the acidity was not so marked.

In lactose, saccharose, starch, sugar free broth, adonite, salicin, inulin, raffinose and erythrol, all the strains of *Bact. sanguinarium* and the first four strains of *Bact. pullorum* produced slight acidity and gradually became alkaline after prolonged incubation.

In glycerin and xylose there was produced slight acidity at first and increased acidity after prolonged incubation. Xylose showed a marked increase in acidity after sterilization, before inoculation, and the medium turned to a brownish color.

Smith and Ten Broeck suggest that these organisms may be a species in the making. They said that they cannot affirm at present whether any strains of *Bact. sanguinarium* produce gas when freshly isolated, or whether certain freshly isolated strains of *Bact. pullorum* do not produce gas.

Taylor described a recent outbreak of fowl typhoid in which the causative organism produced acid and no gas in dextrose and mannite. This freshly isolated strain of *Bact sanguinarium,* apparently, resembles those strains of *Bact. sanguinarium* that have been kept under artificial cultivation for a considerable length of time.

One year from the date of this work an attempt was made to determine whether there was any change in the gas production of the various organisms. The work was repeated with dextrose, mannite and galactose, and the results obtained were identical with those of the year previous.

The atypical strain, *Bact. pullorum* 5, differed markedly from the other strains of *Bact. pullorum* studied. It produced acid in milk in twenty-four hours and coagulated milk in twelve days. In this coagulum the whey was not separated from the curd. It did not produce gas in any of the carbohydrates used and it produced more marked acidity than the other strains of *Bact. pullorum.* It is so markedly different from the other strains that it is doubtful whether it should be considered as a strain of *Bact. pullorum.*

Conclusion. The preceding data show that the principal differences in the strains of *Bacterium pullorum* and *Bacterium sanguinarium* studied, lie in the fact that *Bacterium pullorum* produces gas in various carbohydrates while *Bacterium sanguinarium* lacks this power in any of the carbohydrates used. This difference appears to be constant. Judging from the present classification of species of bacteria, this difference in gas production as well as their different actions on milk, maltose, dulcite, dextrin and isodulcite seem to indicate that these two organisms are two distinct species of bacteria.

As this paper was going to press, there appeared an article on the subject by Rettger and Koser. In general, their results correspond with those in this paper. In addition they find that these two organisms differ as regards their reaction to the methyl red test when applied to cultures grown in 1% Maltose,—bouillon

Bact. sanguinarium being methyl red positive and *Bact. pullorum* negative.

The lesser gas production obtained by them may be explained by the fact that beef extract bouillon was used as a basis instead of meat infusion bouillon.

ACKNOWLEDGMENT. The author wishes to take this opportunity to express his thanks to Drs. V. A. Moore and C. P. Fitch for obtaining the material and for valuable suggestions which helped to make this work possible.

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Tables showing titration of 21 different media for a period of 30 days, indicating the comparative acidity and also gas production of various strains of *Bact. Sanguinarium* and *Bact. Pullorum*.

		Average Gas in 5 Days	Check	2nd day	3rd day	4th day	5th day	10th day	15th day	20th day	30th day
Dextrose	B. Sang. 1	No	1.2,1.2	4.2,4.2	3.9,4.0	3.8,3.7	3.9,3.9	4.1,4.1	4.3, 4.2	3.6, 3.5	3.6, 3.7
	B. Sang. 2	No	1.2,1.2	3.9,3.8	3.5,3.4	3.7,3.9	3.8,3.7	3.8,3.7	3.9, 3.9	3.5, 3.5	3.5, 3.2
	B. Sang. 3	No	1.0,0.9	3.9,4.0	4.1,4.1	4.2,4.3	4.1,4.2	4.7,4.6	3.2, 3.3	3.6, 3.6	3.6, 3.6
	B. Pul. 1	Bubble	1.0,0.9	4.1,4.2	4.2,4.3	4.3,4.2	4.3,4.4	4.8,4.9	4.6, 4.5	3.7, 4.0	4.6, 4.7
	B. Pul. 2	1.5 cm.	1.0,0.9	2.8,2.8	3.1,3.1	3.4,3.2	3.5,3.3	3.8,3.9	4.2, 4.3	4.5, 4.8	5.0, 4.9
	B. Pul. 3	Bubble	1.0,0.9	4.7,4.6	4.7,4.8	4.6,4.6	4.5,4.7	5.4,5.6	4.6, 4.6	4.2, 4.7	5.2, 4.6
	B. Pul. 4	1.5 cm.	1.0,0.9	4.7,4.7	4.7,4.8	4.4,4.7	4.8,4.8	5.0,5.0	5.4, 5.4	5.0, 4.7	5.3, 4.9
	B. Pul. 4	No	1.0,0.9	6.5,7.0	6.4,7.2	7.7,7.8	8.0,8.0	8.6,8.5	7.0, 7.3	7.6, 7.4	8.1, 8.6
Lactose	B. Sang. 1	No	0.5,0.5	1.0,1.1	0.9,1.0	0.6,0.8	0.7,0.8	0.2,0.3	-0.2,-0.1	0.0, 0.3	0.5, 0.9
	B. Sang. 2	No	0.5,0.5	1.1,1.0	0.9,0.9	0.7,0.8	0.1,0.9	0.7,0.7	0.3, 0.4	0.7, 0.8	0.5, 0.6
	B. Sang. 3	No	1.0,0.9	1.4,1.4	1.4,1.3	1.2,1.2	1.2,1.2	0.2,0.1	-0.1,-0.2	1.0, 0.8	1.1, 0.8
	B. Pul. 1	No	1.0,0.9	1.5,1.6	1.4,1.5	1.5,1.6	1.6,1.2	1.2,1.1	0.8, 1.4	1.1, 1.1	1.7, 1.9
	B. Pul. 2	No	1.0,0.9	1.3,1.3	1.5,1.3	1.4,1.3	1.4,1.5	1.0,1.0	-0.2, 0.2	0.4, 0.3	-0.7, 0.1
	B. Pul. 3	No	0.6,0.7	0.9,0.9	0.9,1.0	0.8,0.9	0.8,1.0	0.9,0.1	-0.1, 0.1	0.3, 0.2	1.2, 0.2
	B. Pul. 4	No	0.6,0.7	0.8,0.9	0.8,1.0	0.9,0.9	0.7,0.9	0.5,0.4	0.4, 0.2	-0.1, 0.0	0.5, 0.4
	B. Pul. 5	No	1.0,0.9	4.7,4.6	5.2,5.4	5.4,5.3	5.7,5.1	5.7,6.2	6.5, 5.9	5.0, 5.0	5.1, 4.6

		Average Gas in 5 Days	Check	2nd day	3rd day	4th day	5th day	10th day	15th day	20th day	30th day
Saccharose	B. Sang. 1	No	0.9,0.9	1.2,1.2	1.1,1.2	1.1,1.0	1.1,1.0	0.9,0.6	–0.1, 0.3	1.0, 1.0	1.1, 1.1
	B. Sang. 2	No	0.9,0.8	1.1,1.1	1.2,1.2	1.0,1.0	1.0,1.2	1.1,1.1	0.7, 0.6	0.5, 0.5	1.0, 1.0
	B. Sang. 3	No	0.9,0.8	1.2,1.2	1.1,1.0	1.0,0.9	0.9,0.9	0.5,0.6	0.0, 0.2	1.1, 0.9	1.2, 1.2
	B. Pul. 1	No	0.9,0.8	1.1,1.2	1.2,1.2	1.1,1.0	1.1,1.0	0.7,0.6	0.4, 0.2	1.1, 0.6	0.4, 0.7
	B. Pul. 2	No	0.9,0.8	1.1,1.1	1.2,1.1	1.1,1.2	1.1,1.0	0.5,0.6	0.2, 0.5	0.3,–0.2	–0.8,–0.1
	B. Pul. 3	No	0.6,0.7	0.8,0.9	1.0,0.9	0.9,0.9	0.8,0.8	–0.5,0.6	0.3, 0.3	0.3, 0.0	–0.4, 0.3
	B. Pul. 4	No	0.6,0.7	0.9,0.9	0.9,0.9	0.5,0.9	0.7,0.8	0.5,0.5	0.2, 0.2	0.3, 0.6	0.3, 0.2
	B. Pul. 5	No	0.9,0.8	6.0,6.2	6.3,6.2	6.3,6.3	6.5,6.5	7.0,6.9	7.4, 7.4	5.8, 6.0	5.8, 6.1
Mannite	B. Sang. 1	No	1.0,1.0	3.6,3.5	3.3,3.3	3.3,3.4	3.4,3.2	3.6,3.7	3.7, 3.6	3.2, 3.2	3.0, 3.3
	B. Sang. 2	No	1.0,1.0	3.2,3.3	3.2,3.1	3.2,3.1	3.3,3.3	3.5,3.0	3.5, 3.7	3.0, 3.7	3.1, 3.1
	B. Sang. 3	No	1.3,1.5	3.2,3.0	3.2,3.3	3.1,3.2	3.3,3.4	3.6,3.8	3.7, 3.1	3.2, 3.6	3.1, 3.0
	B. Pul. 1	Bubble	1.3,1.5	3.7,3.7	3.7,3.8	3.7,3.8	4.2,4.0	4.2,4.3	4.3, 4.2	4.2, 5.0	4.1, 5.5
	B. Pul. 2	Bubble	1.3,1.5	3.0,3.1	3.2,3.1	3.1,3.2	3.2,3.3	3.5,3.5	3.8, 3.8	4.0, 4.5	4.7, 4.1
	B. Pul. 3	Bubble	0.5,0.6	4.0,4.1	4.0,4.0	4.0,4.1	4.1,4.0	4.1,4.3	4.1, 4.1	4.1, 4.8	4.6, 4.6
	B. Pul. 4	1.8 cm.	0.5,0.6	4.4,4.4	4.1,4.1	4.2,4.3	4.3,4.5	4.7,4.6	4.8, 4.7	4.3, 4.1	4.4, 4.1
	B. Pul. 5	No	1.3,1.5	4.0,3.7	3.9,4.0	4.3,4.3	4.3,4.2	4.5,4.5	5.0, 4.9	4.4, 4.3	5.3, 5.7
Dextrine	B. Sang. 1	No	1.1,1.1	2.2,2.1	2.3,2.1	1.9,2.4	2.3,2.3	2.2,2.3	2.1, 1.9	1.3, 1.5	1.6, 1.5
	B. Sang. 2	No	1.1,1.1	2.1,2.1	1.9,2.0	2.3,2.3	19.,1.9	1.8,1.9	1.7, 2.0	1.7, 2.6	1.8, 2.2
	B. Sang. 3	No	1.0,1.0	1.9,1.9	1.9,1.9	2.0,1.9	1.9,1.9	2.1,2.1	2.0, 2.1	1.6, 1.8	2.8, 2.8
	B. Pul. 1	No	1.0,1.0	1.4,1.5	1.5,1.5	1.5,1.4	1.5,1.4	1.3,1.1	0.8, 2.0	1.1, 1.3	0.9, 1.0
	B. Pul. 2	No	1.0,1.0	1.4,1.3	1.4,1.3	1.5,1.4	1.1,1.1	1.1,0.8	0.4, 0.5	–0.5, 0.4	–0.8,–0.4
	B. Pul. 3	No	1.1,1.0	1.4,1.3	1.2,1.4	1.3,1.4	1.1,1.2	0.6,0.7	0.6, 0.5	0.7, 0.6	0.6, 1.9
	B. Pul. 4	No	1.1,1.0	1.3,1.2	2.5,1.6	1.3,1.1	1.1,1.1	1.0,1.1	1.1, 1.0	0.8, 0.7	0.2, 0.0
	B. Pul. 5	No	1.0,1.0	2.3,2.3	2.5,2.5	2.7,2.5	2.7,2.8	3.4,3.5	3.7, 3.9	3.7, 3.6	4.0, 4.2
Inuline	B. Sang. 1	No	0.4,0.3	0.6,0.7	0.7,0.5	0.8,0.6	0.5,0.6	0.3,0.4	0.0,–0.1	0.4, 0.5	0.5, 0.4
	B. Sang. 2	No	0.4,0.3	0.7,0.7	0.6,0.6	0.6,0.5	0.6,0.6	0.6,0.6	0.3, 0.5	0.4, 0.5	0.4, 0.4
	B. Sang. 3	No	1.4,1.5	1.9,1.7	1.7,1.7	1.9,1.8	1.2,1.2	0.6,0.5	–0.1, 0.0	0.0, 0.6	–0.3,–0.4
	B. Pul. 1	No	1.4,1.5	1.8,1.8	1.9,1.9	1.8,1.8	1.2,1.4	1.0,0.5	0.5, 0.5	0.3, 0.6	–0.2,–0.2
	B. Pul. 2	No	1.4,1.5	1.8,1.7	1.8,1.9	1.4,1.6	1.1,1.4	0.8,04.	–0.4,–0.1	–0.2, 0.6	0.3, 0.5
	B. Pul. 3	No	1.4,1.5	1.6,1.6	1.6,1.9	1.4,1.3	1.2,1.3	0.5,0.6	0.5, 0.5	–0.1, 0.0	–0.2, 0.0
	B. Pul. 4	No	1.4,1.5	1.6,1.6	1.6,1.6	1.2,1.3	1.1,1.1	0.8,0.9	0.4, 0.9	0.3, 0.0	–0.3–0.2
	B. Pul. 5	No	1.4,1.5	2.2,1.8	2.0,1.9	1.6,1.7	1.7,1.7	2.1,2.1	2.4, 2.4	1.8, 1.9	1.9, 2.1
Galactose	B. Sang. 1	No	0.6,0.7	3.7,3.2	3.2,3.7	3.3,2.8	3.8,3.7	3.2,3.3	2.8, 3.6	3.4, 3.7	3.7, 3.9
	B. Sang. 2	No	0.6,0.7	3.7,3.1	3.2,3.0	2.9,3.1	3.1,3.0	3.3,3.5	3.5, 3.7	3.5, 3.9	3.1, 3.2
	B. Sang. 3	No	1.4,1.3	3.9,3.9	3.7,4.0	3.7,3.9	3.6,3.8	4.1,4.0	4.7, 4.1	3.9, 3.9	4.1, 4.0
	B. Pul. 1	3.6 cm.	1.4,1.3	4.4,4.6	4.7,4.5	5.1,5.0	4.2,4.6	5.1,5.0	6.9, 5.3	4.1, 4.3	4.5, 5.0
	B. Pul. 2	1.3 cm.	1.4,1.3	4.0,4.2	4.1,4.2	4.5,4.6	4.0,4.7	4.5,4.9	5.7, 5.7	4.3, 4.3	4.8, 4.3
	B. Pul. 3	1.4 cm.	1.4,1.3	3.9,3.9	3.9,4.1	4.0,4.1	4.1,4.1	4.4,4.5	5.2, 5.3	4.2, 4.6	4.5, 4.5
	B. Pul. 4	3.7 cm.	1.4,1.3	4.0,4.6	4.5,4.2	4.5,4.5	4.3,4.7	4.5,4.8	5.3, 5.3	4.6, 4.2	4.6, 4.6
	B. Pul. 5	No	1.4,1.3	3.4,3.5	4.3,4.3	4.5,4.5	4.6,4.7	5.4,5.6	6.1, 6.1	5.2, 4.9	5.2, 5.1
Levulose	B. Sang. 1	No	0.9,0.9	4.0,4.2	4.1,4.1	3.8,4.0	4.1,4.0	4.4,4.3	4.4, 4.3	3.9, 3.9	3.9, 4.2
	B. Sang. 2	No	0.9,0.9	4.3,4.3	4.2,4.2	4.2,4.2	4.2,4.2	4.6,4.6	4.6, 4.6	4.7, 4.9	4.4, 4.2
	B. Sang. 3	No	1.0,1.1	3.8,3.7	4.0,4.1	4.0,4.0	3.7,3.8	4.2,4.0	4.7, 4.8	4.0, 3.9	4.1, 4.3
	B. Pul. 1	Bubble	1.0,1.1	3.0,3.0	3.6,3.5	3.7,3.9	3.4,3.3	3.7,3.7	4.5, 4.5	3.5, 3.6	3.8, 4.0
	B. Pul. 2	Bubble	1.0,1.1	3.3,3.2	3.4,3.5	3.2,3.4	3.4,3.5	3.6,3.6	4.0, 4.1	3.6, 3.5	3.9, 3.8
	B. Pul. 3	Bubble	1.0,1.1	2.7,2.8	3.3,3.3	3.3,3.2	3.0,2.8	3.3,3.8	4.6, 4.6	3.5, 3.7	3.6, 3.7
	B. Pul. 4	Bubble	1.0,1.1	3.0,3.0	3.2,3.5	3.2,3.3	3.5,3.5	3.6,3.6	4.6, 4.4	3.2, 3.5	4.0, 3.8
	B. Pul. 5	No	1.0,1.1	6.8,6.7	7.1,7.2	6.9,6.9	7.1,7.3	8.2,8.2	8.8, 9.1	7.4, 7.1	8.0, 8.0

		Average Gas in 5 Days	Check	2nd day	3rd day	4th day	5th day	10th day	15th day	20th day	30th day
Raffinose	B. Sang. 1	No	0.4,0.4	0.8,0.6	0.5,0.5	0.6,0.5	0.5,0.5	0.5,0.5	0.2, 0.1	0.3, 0.7	0.2, 0.3
	B. Sang. 2	No	0.4,0.4	0.7,0.4	0.5,0.7	0.5,0.5	0.5,0.6	0.7,0.6	0.5. 0.5	0.4, 0.7	0.0, 0.0
	B. Sang. 3	No	1.2,1.1	1.6,1.4	1.4,1.4	1.2,1.3	1.0,1.2	0.7,0.4	0.2, 0.0	0.2, 0.0	–0.3, 0.3
	B. Pul. 1	No	1.2,1.1	1.5,1.4	1.5,1.5	1.1,1.6	1.2,1.0	0.5,0.1	0.8, 0.6	0.4, 0.5	–0.4,–0.2
	B. Pul. 2	No	1.2,1.1	1.3,1.3	1.4,1.5	1.1,1.1	0.8,0.7	0.1,0.8	–0.1, 0.0	–0.3, 0.4	–0.4,–0.4
	B. Pul. 3	No	1.2,1.1	1.2,1.3	1.3,1.3	0.9,1.1	0.9,0.9	0.3,0.1	0.3, 0.4	0.2, 0.1	–0.3,–0.2
	B. Pul. 4	No	1.2,1.1	1.3,1.4	1.4,1.2	1.0,1.0	0.8,0.7	0.6,0.4	0.5, 0.5	0.3, 0.5	–0.2, 0.4
	B. Pul. 5	No	1.2,1.1	1.2,1.3	1.4,1.5	1.4,1.4	2.0,1.7	4.0,5.0	5.4, 5.3	4.6, 5.0	4.9, 5.0
Amygdalin	B. Sang. 1	No	0.5,0.5	0.9,0.9	0.8,0.8	0.6,0.7	0.6,0.6	0.5,0.5	0.2, 0.2	0.7, 0.7	0.7, 1.1
	B. Sang. 2	No	0.5,0.5	0.8,0.8	0.7,0.8	0.7,0.8	0.8,0.9	0.9,0.9	0.6, 0.7	0.6, 0.8	0.8, 0.8
	B. Sang. 3	No	0.7,0.7	3.6,3.6	3.6,3.4	3.7,3.6	3.3,3.4	3.1,3.1	2.3, 2.9	2.1, 0.5	0.8, 0.8
	B. Pul. 1	No	0.7,0.7	3.5,3.6	3.4,3.7	3.7,3.7	3.4,3.2	3.4,3.6	4.2, 4.5	3.9, 3.9	3.9, 3.8
	B. Pul. 2	No	0.7,0.7	3.4,3.4	3.3,3.2	3.0,3.1	3.1,3.1	3.2.3.3	3.4, 3.0	4.0, 3.9	4.1, 4.2
	B. Pul. 3	No	0.7,0.7	3.4,3.5	3.5,3.5	3.3,3.2	3.1,3.0	3.1,3.2	3.9, 3.5	2.5, 2.0	2.0, 2.0
	B. Pul. 4	No	0.7,0.7	3.5,3.5	3.4,3.5	3.4,3.2	3.2,3.3	3.2,3.2	3.9, 3.9	2.8, 2.8	3.1, 3.0
	B. Pul. 5	No	0.7,0.7	3.0,2.9	3.1,3.4	2.8,3.1	3.1,3.2	4.1,4.5	5.3, 5.6	5.3, 5.0	5.5, 5.4
Arabinose	B. Sang. 1	No	0.6,0.5	3.4,3.2	3.5,3.7	3.6,3.6	3.6,3.5	3.6,3.6	3.8, 3.7	3.6, 3.8	3.5, 3.5
	B. Sang. 2	No	0.6,0.5	3.3,3.3	3.5,3.5	3.5,3.5	3.4,3.4	3.3,3.4	3.5, 3.4	3.6, 3.7	3.4, 3.4
	B. Sang. 3	No	1.7,1.6	3.2,3.2	3.3,3.2	3.3,3.4	3.5,3.4	3.7,3.6	3.8, 4.1	4.6, 4.2	5.9, 5.8
	B. Pul. 1	1.8 cm.	1.7,1.6	3.8,3.7	4.1,3.6	3.9,3.9	4.0,4.0	4.3,4.4	4.8, 4.9	5.5, 5.4	6.4, 6.8
	B. Pul. 2	2 cm.	1.7,1.6	3.8,3.6	3.8,3.8	3.8,3.9	3.8,3.8	4.4,4.2	4.3, 4.6	5.4, 5.5	7.6, 7.8
	B. Pul. 3	1.1 cm.	1.7,1.6	3.5,3.6	3.8,3.9	3.7,3.7	3.8,3.7	4.3,4.3	4.6, 4.5	5.1, 5.2	6.0, 6.0
	B. Pul. 4	2.3 cm.	1.7,1.6	3.6,2.0	4.0,4.0	3.9,2.4	4.0,2.2	4.3,4.3	4.7, 4.6	5.1, 5.4	6.2, 4.3
	B. Pul. 5	No	1.7,1.6	5.6,5.7	5.8,5.9	5.9,5.7	6.7,6.2	7.0,6.7	7.3, 7.2	8.0, 8.3	10.4,10.8
Adonite	B. Sang. 1	No	0.3,0.3	0.5,0.4	0.7,0.6	0.6,0.5	0.6,0.5	0.4,0.5	0.3, 0.3	0.2, 0.2	0.2, 0.2
	B. Sang. 2	No	0.3,0.3	0.6,0.7	0.6,0.8	0.4,0.4	0.5,0.5	0.3,0.1	0.4, 0.3	0.0, 0.0	–0.1,–0.1
	B. Sang. 3	No	0.7,0.6	1.0,1.1	0.9,0.8	0.9,0.8	0.9,0.9	0.5,0.5	0.0, 0.3	0.1, 0.1	0.6, 0.2
	B. Pul. 1	No	0.7,0.6	1.0,1.0	0.8,0.9	0.8,0.9	0.7,0.8	0.6,0.4	0.2, 0.1	0.1, 0.3	–0.3, 0.2
	B. Pul. 2	No	0.7,0.6	0.7,0.8	0.8,0.8	0.6,0.5	0.4,0.4	0.4,0.4	0.0, 0.0	0.1, 0.1	–0.1,–0.2
	B. Pul. 3	No	0.7,0.6	1.0,0.9	0.9,0.9	0.9,0.9	0.7,0.8	0.6,0.5	0.0, 0.0	0.1, 0.1	0.1, 0.1
	B. Pul. 4	No	0.7,0.6	0.8,0.6	0.8,0.8	0.6,0.5	0.5,0.6	0.5,0.5	0.2, 0.1	0.2, 0.2	–0.1, 0.0
	B. Pul. 5	No	0.7,0.6	1.0,0.9	0.8,1.0	0.9,0.8	0.9,0.8	1.1,1.1	1.0, 1.0	1.2, 1.3	1.2, 1.1
Dulcite	B. Sang. 1	No	0.5,0.4	3.1,3.1	3.0,3.0	2.8,2.9	2.8,2.7	2.9,3.1	2.8, 3.2	2.7, 2.6	2.8, 2.8
	B. Sang. 2	No	0.5,0.4	3.1,3.1	3.0,3.0	2.8,2.8	2.8,2.9	2.8,2.9	3.1, 2.9	2.8, 2.9	2.4, 2.5
	B. Sang. 2	No	0.5,0.4	2.8,2.9	2.5,2.6	2.6,2.5	2.7,2.5	3.2,3.2	2.9, 3.0	3.6, 4.0	4.8, 5.0
	B. Pul. 1	No	0.5,0.4	0.9,0.8	0.8,1.0	0.8,0.8	0.6,0.7	0.3,0.3	0.2, 0.1	0.0, 0.0	–0.3, 0.3
	B. Pul. 2	No	0.5,0.4	0.7,0.8	0.7,0.7	0.5,0.5	0.5,0.4	0.4,0.2	0.2, 0.3	0.0, 0.1	–0.2, 0.2
	B. Pul. 3	No	0.5,0.4	0.9,0.8	0.8,0.8	0.8,0.7	0.9,0.8	0.5,0.5	0.2, 0.4	0.2, 0.2	0.5, 0.2
	B. Pul. 4	No	0.5,0.4	0.8,0.8	0.8,0.9	0.7,0.7	0.6,0.5	0.4,0.5	0.3, 0.2	0.1, 0.1	0.3, 0.3
	B. Pul. 5	No	0.5,0.4	0.6,0.8	0.8,0.8	0.8,0.9	0.9,0.7	1.0,1.0	1.0, 1.0	1.2, 1.1	1.6, 1.8
Xylose	B. Sang. 1	No	1.5,1.7	2.1,2.1	2.3,2.3	2.3,2.4	2.5,2.4	1.8,1.6	3.1, 3.3	3.0, 3.0	3.3, 3.2
	B. Sang. 2	No	1.5,1.7	1.8,1.9	1.9,2.0	1.8,1.8	1.9,1.8	2.8,3.1	3.3, 3.1	2.6, 2.8	3.0, 3.1
	B. Sang. 3	No	1.9,2.1	2.4,2.4	2.5,2.6	2.6,2.6	2.7,2.5	2.8,2.8	3.0, 2.7	3.0, 3.8	4.4, 4.4
	B. Pul. 1	No	1.9,2.1	2.5,2.9	2.9,3.0	3.0,2.9	3.2,3.2	3.4,3.5	4.1, 4.1	4.4, 4.5	4.7, 4.7
	B. Pul. 2	No	1.9,2.1	2.6,2.6	2.5,2.6	2.6,2.5	3.2,3.3	3.6,3.6	4.0, 4.0	4.5, 4.1	5.9, 4.7
	B. Pul. 3	No	1.9,2.1	2.4,2.6	2.8,2.5	2.6,2.5	2.8,2.6	2.7,2.8	3.6, 3.5	3.9, 3.8	5.2, 5.1
	B. Pul. 4	No	1.9,2.1	2.4,2.5	2.6,2.5	2.6,2.4	2.5,2.5	2.9,2.9	3.2, 3.2	3.7, 3.8	4.9, 5.0
	B. Pul. 5	No	1.9,2.1	2.7,2.5	2.7,2.6	2.5,2.7	2.6,2.7	3.2,3.1	3.7, 3.9	4.4, 4.3	5.2, 5.4

		Average Gas in 5 Days	Check	2nd day	3rd day	4th day	5th day	10th day	15th day	20th day	30th day
Salicin	B. Sang. 1	No	0.5,0.5	0.6,0.7	0.8,0.7	0.8,0.7	0.6,0.7	0.5,0.4	0.4, 0.3	0.4, 0.3	0.4, 0.5
	B. Sang. 2	No	0.5,0.5	0.7,0.7	0.8,0.8	0.6,0.7	0.6,0.5	0.5,0.4	1.2, 0.9	0.6, 0.6	0.4, 0.4
	B. Sang. 3	No	0.5,0.4	0.8,0.9	1.5,0.8	0.7,0.7	0.9,0.8	0.6,0.7	0.3, 0.2	0.3, 0.3	-0.1, 0.7
	B. Pul. 1	No	0.5,0.4	0.9,0.9	0.8,0.8	0.7,0.8	0.7,0.8	0.5,0.6	0.0, 0.0	0.0, 0.0	-0.1,-0.1
	B. Pul. 2	No	0.5,0.4	0.7,0.7	0.9,0.6	0.5,0.6	0.5,0.4	0.3,0.3	-0.1,-0.1	-0.2,-0.3	-0.3,-0.3
	B. Pul. 3	No	0.5,0.4	0.8,0.9	0.8,0.8	0.9,0.7	0.7,0.7	0.6,0.5	0.0, 0.0	0.0, 0.0	0.3, 0.3
	B. Pul. 4	No	0.5,0.4	0.9,0.8	0.9,0.7	0.6,0.7	0.7,0.6	0.5,0.4	0.3, 0.1	0.2, 0.3	0.2, 0.1
	B. Pul. 5	No	0.5,0.4	5.0,5.0	5.2,5.0	4.8,5.0	4.9,5.0	5.7,5.6	6.1, 6.2	7.4, 6.9	8.4, 8.6
Isodulcite	B. Sang. 1	No	1.0,0.9	1.7,1.6	2.0,2.0	2.2,2.4	3.0,2.6	2.5,2.7	2.4, 2.5	2.5, 2.5	2.6, 2.4
	B. Sang. 1	No	1.0,0.9	1.6,1.5	1.3,1.3	2.4,2.4	2.8,2.8	3.0,3.3	3.3, 3.8	3.2, 3.5	3.7, 3.4
	B. Sang. 3	No	0.7,0.6	1.4,1.4	1.4,1.3	1.6,1.5	2.1,2.1	2.8,2.7	3.1, 3.1	3.0, 3.4	4.0, 4.3
	B. Pul. 1	Bubble	0.7,0.6	3.0,4.1	4.2,4.1	4.1,4.2	4.2,4.2	4.5,4.6	5.1, 4.8	5.1, 4.9	6.2, 6.6
	B. Pul. 2	1 cm.	0.7,0.6	3.5,3.6	4.1,3.7	3.9,3.9	4.1,4.2	4.5,4.4	4.9, 5.3	5.1, 5.5	6.9, 6.7
	B. Pul. 3	1.2 cm.	0.7,0.6	3.4,3.4	3.9,3.9	3.9,3.9	4.1,4.0	4.1,4.2	4.6, 4.7	4.7, 5.0	6.0, 5.8
	B. Pul. 4	2 cm.	0.7,0.6	3.3,3.2	3.9,3.9	3.7,3.9	3.8,3.6	4.1,4.2	4.4, 4.5	4.9, 4.8	6.0, 5.8
	B. Pul. 5	No	0.7,0.6	2.7,2.9	3.1,3.1	3.3,3.2	3.8,3.4	2.9,3.4	4.3, 4.0	4.0, 4.4	5.4, 5.3
Mannose	B. Sang. 1	No	0.7,0.8	3.9,3.9	3.8,3.8	3.9,3.9	4.0,3.9	4.0,4.0	4.2, 4.3	4.2, 4.2	4.0, 3.9
	B. Sang. 2	No	0.7,0.8	3.9,3.8	3.9,4.0	3.9,4.0	3.9,3.9	3.9,4.0	4.2, 3.8	4.0, 3.9	4.3, 4.0
	B. Sang. 3	No	0.5,0.5	3.2,3.7	4.0,3.8	3.7,3.6	3.4,3.4	4.1,4.0	4.4, 4.1	4.3, 4.0	5.5, 5.5
	B. Pul. 1	1.1 cm.	0.5,0.5	3.7,3.7	4.1,4.1	4.0,4.0	4.1,4.0	4.5,4.4	4.8, 4.9	5.0, 4.9	5.9, 6.2
	B. Pul. 2	1 cm.	0.5,0.5	3.3,3.4	4.0,4.0	3.9,4.0	4.1,4.1	4.6,4.5	4.7, 4.7	5.2, 5.1	6.3, 6.1
	B. Pul. 3	3 cm.	0.5,0.5	3.7,3.6	4.1,4.0	4.1,4.1	4.1,4.2	4.3,4.3	4.6, 4.7	5.1, 5.1	5.7, 6.0
	B. Pul. 4	6 mm.	0.5,0.5	3.8,3.8	3.9,4.0	4.0,4.0	4.1,4.2	4.4,5.4	4.9, 4.9	5.0, 4.9	6.1, 6.7
	B. Pul. 5	No	0.5,0.5	5.8,5.8	6.4,6.5	6.6,6.4	6.7,6.4	7.0,6.7	6.7, 7.1	8.3, 7.7	8.9, 9.6
Starch	B. Sang. 1	No	1.2,1.1	1.2,1.1	1.0,1.2	0.9,1.0	0.9,1.0	0.6,0.6	0.4, 0.3	0.6, 0.0	0.4, 0.3
	B. Sang. 2	No	1.2,1.1	1.2,1.3	1.1,1.2	1.1,1.1	1.2,1.2	1.0,1.0	0.5, 1.0	0.7, 1.2	0.4, 0.5
	B. Sang. 3	No	0.4,0.3	0.4,0.6	0.6,0.8	0.4,0.6	1.1,1.0	0.6,0.5	0.4, 0.0	0.2, 0.3	0.2, 0.3
	B. Pul. 1	No	0.4,0.3	0.5,0.4	0.8,0.7	0.6,0.6	0.6,0.6	0.4,0.5	0.3, 0.7	0.2, 0.4	-0.1,-0.1
	B. Pul. 2	No	0.4,0.3	0.5,0.5	0.8,0.6	0.6,0.6	0.6,0.7	0.3,0.5	0.5, 0.3	0.0, 0.0	-0.1,-0.1
	B. Pul. 3	No	0.4,0.3	0.5,0.4	0.6,0.5	0.5,0.6	0.5,0.6	0.3,0.4	0.4, 0.3	0.3, 0.3	-0.1,-0.1
	B. Pul. 4	No	0.4,0.3	0.4,0.4	0.8,0.9	0.6,0.8	0.6,0.6	0.5,0.5	0.3, 0.4	0.3, 0.3	0.0, 0.0
	B. Pul. 5	No	0.4,0.3	0.5,0.4	0.8,0.7	0.7,0.7	0.6,0.5	0.8,0.9	1.0, 0.9	1.0, 1.0	1.2, 1.3
Glycerin	B. Sang. 1	No	1.2,1.1	1.6,1.6	1.6,1.5	1.8,1.8	1.6,1.8	2.6,2.6	2.5, 2.8	3.1, 3.0	2.5, 2.3
	B. Sang. 2	No	1.2,1.1	1.5,1.5	1.6,1.6	1.7,1.7	1.7,1.8	2.1,2.3	2.6, 1.9	2.4, 2.6	2.2, 1.8
	B. Sang. 3	No	0.6,0.6	1.1,0.9	1.3,1.2	1.1,1.3	1.3,1.2	2.3,2.2	2.5, 2.4	3.1, 3.2	4.0, 4.2
	B. Pul. 1	No	0.6,0.6	0.9,1.0	1.2,1.2	1.0,1.2	1.5,1.8	2.5,2.5	4.4, 4.6	5.0, 4.9	6.0, 5.8
	B. Pul. 2	No	0.6,0.6	1.1,1.0	1.1,1.2	1.3,1.1	1.5,1.5	2.7,1.9	3.1, 4.1	3.8, 4.2	4.9, 4.8
	B. Pul. 3	No	0.6,0.6	0.9,0.8	1.0,0.9	1.1,1.0	1.0,1.2	1.6,1.7	2.2, 1.9	3.1, 3.0	3.6, 3.3
	B. Pul. 4	No	0.6,0.6	0.9,0.9	1.1,1.2	1.0,1.2	1.5,1.4	2.5,2.0	3.1, 2.5	2.4, 2.6	3.5, 3.6
	B. Pul. 5	No	0.6,0.6	0.9,0.9	1.1,1.0	1.0,1.0	1.0,1.0	1.7,1.6	2.2, 2.1	3.1, 2.9	5.0, 4.5
Sugar free broth	B. Sang. 1	No	0.4,0.4	0.7,0.8	0.7,0.8	0.7,0.7	0.4,0.4	0.2,0.3	0.1, 0.0	0.5, 0.5	0.1, 0.2
	B. Sang. 2	No	0.4,0.4	0.7,0.7	0.6,0.7	0.7,0.6	0.5,0.4	0.5,0.5	-0.3, 0.2	0.5, 0.5	0.1, 0.3
	B. Sang. 3	No	0.6,0.5	0.9,0.8	1.1,1.0	0.7,1.0	0.9,0.9	0.7,0.7	0.5, 0.6	0.4, 0.5	0.4, 0.4
	B. Pul. 1	No	0.6,0.5	0.8,0.8	1.1,1.2	0.8,0.8	0.8,0.9	0.6,0.5	0.1, 0.1	0.4, 0.3	-0.3,-0.4
	B. Pul. 2	No	0.6,0.5	0.9,9.8	0.9,0.9	0.9,0.8	0.7,0.7	0.5,0.5	0.3, 0.4	0.3, 0.2	-0.3,-0.1
	B. Pul. 3	No	0.6,0.5	0.8,0.7	1.0,0.8	1.0,1.0	0.9,0.8	0.5,0.4	0.4, 0.3	0.2, 0.3	0.0, 0.0
	B. Pul. 4	No	0.6,0.5	0.8,0.8	1.1,1.0	0.9,1.0	0.7,0.7	0.5,0.7	0.4, 0.4	0.3, 0.2	0.0, 0.0
	B. Pul. 5	No	0.6,0.5	0.7,0.8	1.1,1.1	1.0,0.9	0.8,0.9	1.1,1.0	1.0, 1.0	1.2, 1.3	1.4, 1.3
Erythrol	B. Sang. 1	No	0.4,0.5	0.6,0.7	0.7,0.8	0.5,0.7	0.6,0.4	0.2,0.3	-0.1, 0.0	0.7, 0.7	0.3, 0.2
	B. Sang. 2	No	0.4,0.5	0.7,0.7	0.7,0.7	0.7,0.7	0.6,0.5	0.4,0.3	0.2, 0.8	0.3, 0.8	0.5, 0.7
	B. Sang. 3	No	0.7,0.7	0.9,0.9	1.0,0.9	0.8,0.8	0.6,0.7	0.5,0.5	0.2, 0.2	0.2, 0.0	-0.2, 0.3
	B. Pul. 1	No	0.7,0.7	1.0,0.9	1.0,1.0	0.5,0.5	0.7,0.6	0.6,0.5	0.2, 0.0	-0.1, 0.3	0.0, 0.0
	B. Pul. 2	No	0.7,0.7	0.9,0.8	0.9,0.9	0.8,0.8	0.6,0.7	0.4,0.3	0.1, 0.1	0.0, 0.0	-0.1,-0.2
	B. Pul. 3	No	0.7,0.7	0.9,0.9	1.0,0.9	0.9,0.8	0.8,0.7	0.6,0.6	0.2, 0.2	1.0, 0.3	0.3, 0.4
	B. Pul. 4	No	0.7,0.7	1.0,0.9	0.9,1.0	0.8,0.8	0.7,0.7	0.6,0.7	0.3, 0.3	0.2, 0.1	-0.1,-0.1
	B. Pul. 5	No	0.7,0.7	0.9,0.9	1.0,1.0	0.8,0.9	0.8,0.8	1.0,1.0	1.0, 1.0	1.2, 1.1	1.4, 1.4

A RATIONAL AND SUCCESSFUL METHOD OF PREVENTING ABORTION IN CATTLE*

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The subject of abortion has received a great deal of attention in the last few years at most veterinary conventions. It is not my purpose to go into any detailed discussion of this subject for almost every phase has been thoroughly discussed and yet there is much to be learned.

For many years I believed in the infectiousness of the bull and have written many papers and discussed the importance of thoroughly sterilizing the bull to prevent the spread of this disease, but some four years ago I was convinced that this animal did not play so important a part in the transmission of this disease as I had formerly supposed.

This disease was found in the very best sanitary, regulated stables where great emphasis was placed on the cleaning and disinfecting of the animals. Precaution was also taken not to introduce new animals without quarantining them for several weeks or months and subjecting them also to thorough disinfection. Such remedies as isolation, carbolic acid, methyl blue, or the injection of bacterin had little or no effect in controlling this disease.

I then began to study the question thoroughly from a feeding standpoint and found that there was a great deal to be learned relative to the feeding of dairy cattle and in fact all farm animals. The first real impression of the value of mineral matter was brought home to me by my own feeding operations, where I was feeding many thousand head of hogs on cement floors. It was noted that these animals required a large amount of mineral matter to keep them in good condition and free from such ailments as weak backs and the usual symptoms of rheumatism. I found that a stable containing two thousand head of hogs required, per week, a little over one ton of mineral matter. I then began to look into the literature on this subject and I found that we largely depend on the feed to contain this mineral matter, especially the leaves. They are supposed to contain the phosphate of lime, but at certain times of the year, feed, such as timothy, alfalfa and clover is sadly de-

*Read before the annual meeting of the Illinois Veterinary Association, Chicago, Ill., December 1916.

ficient in mineral matter. This has been shown by experiments conducted by E. Kemasz in 1914.

The professors of the various experiment stations have emphasized the value of mineral matter and claim that without lime and phosphoric acid and other minerals, bone formation would be impossible. In growing animals, especially in young stock it is important that sufficient mineral matter be constantly supplied by the food, so as to assist in the development of the bone. As a rule, most of our feeds, except corn, contain mineral matter in reasonable quantities. In most of these feeds, however, salt is lacking and should be supplied liberally. There can be no doubt about the advantage of feeding a sufficient amount of phosphates to build up strong, healthy bones. A deficiency of phosphates during the growing period may materially affect the development of the growing animals.

"The laboratory tests have also shown that there is no apparent increase in the external measurements of the bones resulting when protein or mineral matter is added to the food nutrients, but that these additional nutrients, so far as they are assimilated, have greatly added to the thickness of the inner surface of the bone walls, thereby reducing the marrow within the bones.

The thickness of the bone wall increased about 50 per cent in those fed bone meal over those fed only corn. The percentage of mineral matter and the specific gravity in the green bones increased in nearly the same proportion as the thickness of the walls."

The University of Wisconsin Report for 1914 says that during the past year a dry pregnant milch goat was fed rations low in lime during the entire gestation period, at the end of which she gave birth to twin five-pound kids, of normal weight and vigor. During this single period of gestation, the goat lost about 20 per cent of the total amount of lime contained in her body, including the amount stored in the bodies of the off-spring, *without any outward or apparent ill effects.*

"These results are in line with those of a previous trial in which 25 per cent of the entire amount of lime contained in a cow's body was withdrawn in an effort to produce milk containing the normal amount of lime. These experiments emphasize the tremendous force of maternity and lay stress on the necessity of supplying the mother developing a fetus or giving milk, with feeds rich in lime."

"Including the requirements for fetus building and for milk production, the 1000 pound pregnant cow building a fetus and giving twenty-five pounds of milk will require from fifty to sixty grams (1.8 to 2.1 ounces) of lime per day. These requirements are usually met by the ordinary farm roughages such as hay and corn stover, but with straw in any large quantity as a part of the ration, the lime supply would be deficient.

"Recently a very important bulletin on this subject was published by the Ohio Experiment Station, entitled 'The Mineral Metabolism of the Milch Cow,' by Forbes, Beegle, Fritz, Morgan and Rhue. These investigations were conducted during January, February and March of 1915 and were the most thorough experiments of this kind conducted in the United States. This report was published in Bulletin 295."

"From the results of this experiment it appears that a failure to maintain mineral equilibrium must be so common among cows of the more profitable sort that it must be considered a normal condition during the time of larger production."

"Under the best conditions of feeding and management, as understood by practical feeders, a cow often fails to breed during the season following one in which she has been fed for a record of high production. It seems quite probable that the excessive lactation has depleted the mineral reserves of the body to such an extent as to disturb the reproductive functions."

"Such a depletion is also reflected in the fact of the failure of many cows fed for high production to maintain high records during two consecutive periods of lactation."

"The time of replenishment of reserves comes, of course, during the latter part of the period of gestation. This process of repair is most efficiently accomplished while the cows are on pasture, particularly if the pasture contains a considerable portion of leguminous vegetation, as indeed most pastures do."

"The object sought in milk production is milk rather than maximum physiological economy; and it is possible that, as a practical measure, we may find it most profitable to exhaust the cow's mineral reserves, at a time when she is able to draw upon them to support liberal milk production and then to repay the over-draft when the cow's tendency to produce milk has so far spent itself that the total outgo falls below the total income of the mineral nutrients."

Believing that abortion in cows was largely due to a run down condition of the animal, especially a lack of mineral matter, caused me to pursue an entirely different method in treating cows for abortion.

By feeding a perfectly blended formula of mineral matter to the animals I soon replenished the lost mineral in the animal body. If you do not replenish your fields with mineral matter your crops will be impoverished and if you do not supply mineral matter to your live stock the results will be the same.

In addition to feeding this mineral matter, the stables were thoroughly disinfected and those showing any signs of discharge were given injections of a saturated solution of bicarbonate of soda. Experience has taught me that it is not advisable to use coal-tar preparations for injections. This treatment has also prevented such sequels to abortion as calf cholera, and the retention of the after-birth. It also has a wonderful influence on the vitality of the calf.

In 106 herds where this formula was applied the results were successful in every case.

SHEEP POISONED BY WESTERN GOLDEN-ROD

(Solidago spectabilis)

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In the latter part of January, 1915, I was instructed to investigate the cause of paralysis and death in a band of sheep being winter-fed on hay near Reno.

My preliminary investigation was unsuccessful in determining the actual cause. The symptoms and history, however, were noted and recorded.

The sheep personally examined manifested profuse nasal discharge (a not uncommon condition), pronounced emaciation, great physical weakness (probably of neurasthenic origin) and profound mental dullness.

The owner stated that the animals examined by me were the survivors of several that had been affected. The majority did not live many days after showing signs of sickness. I learned from him that the sheep when first affected were very excited; that

they would gallop off in their frenzy with high action of the front limbs, then jump into the air, stagger and fall in convulsions. When these fits subsided, the animals would pass into a more or less comatose condition and die, or recovering, would lie around in a weakened state, or, if able to walk, would do so in an aimless manner.

Post-mortem (the brain was not examined) revealed nothing very abnormal. The livers were not "fluky" and the facial sinuses contained relatively few larvae of *Oestrus ovis*.

The quality of the hay fed seemed above suspicion, for it was obtained, the owner stated, as in former years, from clean meadow land.

On October 15th of the same year, the rancher telephoned an urgent request that somebody from the University Veterinary Department be sent at once to see what ailed his band of sheep; for some were crazy, some had died with fits and others were "down". A representative of the department was on the spot within an hour.

The spectacle presented was very interesting. The sheep fortunately were corralled. The owners and herder were busy going from one fallen subject to another with a bloody knife in hand to venesect the angular veins (vena angularis oculi). Sheep after sheep under some peculiar mental strain or impression would start up and career around, stop suddenly and fall over in fits; which, if recovered from, would invariably lead to incessant chewing of any object they could seize. Some were careering, some convulsing, some chewing.

The following is a brief sketch of the history, incidents and sequel of this occurrence:

The band (950–960 Hampshire ewes) under the constant care of a herder was being grazed on meadows about 6 miles south of Reno. No fatalities or abnormal behavior occurred for 5 days (October 10–14th inclusive). The sheep were close-herded so that one plot would be fed clean before another was grazed. The band was corralled each night at dark in a weed-free enclosure and taken out to graze early the following morning.

The meadows were comparatively clean of weeds, except along the banks of irrigation ditches, springs and water-holes and in the marshy areas.

On October 14th—the day preceding the occurrence under observation—the sheep had been grazing on a moist section of the

land where grew wild meadow grass, willows, cat's tail rushes and a profuse but scattered growth of western golden-rod (*Solidago spectabilis*). A careful search was made for wild parsnip (*Cicuta occidentalis*) as this plant is very commonly found in this region along the water ditches and in moist areas and is one of known and well-established toxic properties. This special plant was virtually absent, for the owner had made it a practice for years to dig out and remove it from his feeding grounds.

The sheep when corralled on the night of the 14th showed no signs of physical upset. Early on the 15th (about 6 A. M.) the herder noticed several sheep behaving in a peculiar manner and went off for the owners. These individuals arrived about 8 A. M. to find 25 head severely affected.

The symptoms as observed were: intense and sudden mental excitation, as a result of which the affected subject would, without seeming provocation, start up from the band, career off usually in a straight line with "high action" of the forelimbs and stop suddenly in a dazed condition with the head elevated and quivering. For a minute or less this attitude would be maintained and then followed by a trembling of the neck, limbs and skeletal muscles with a sudden weakening and unsteadiness of gait, in consequence of which the animal would fall and pass into a convulsive state. During and immediately succeeding this condition, the eyes had a vacant stare, the pupils were dilated and the sense of direction and distance appeared completely deranged. As soon as a given sheep ceased the first convulsive motions there was a champing of the jaws with salivation, continual shaking of the head and quivering in the neck associated with increased reflex nerve action as evinced by response to slaps with the hand, pulling the legs, etc. Nystagmus was carefully looked for, but never observed.

In the severer cases the attacks of convulsions would rapidly succeed each other and death would occur usually within one hour. In less severe, the affected animal would lie on the side, exhibit repeated but less intense convulsive paroxyms, breathe rapidly and keep the limbs constantly in "trotting motion" until death after a variable space of time.

Mildly affected cases would go through the motions described in the stage of excitement, fall, and, after one or two convulsive attacks, would rise trembling on all four legs or more usually on the posterior and support the front quarters on the knees. In this at-

titude they all seemed possessed with an uncontrollable desire to immediately seek and seize some nearby object. This might be a stick, a stone or a lump of dry cow manure. Once in possession they would chew upon it incessantly for hours. The object so obtained was not masticated, for it seldom passed farther back than the commissure of the lips.

The band was kept corralled and under observation from 6 A. M. to 4 P. M. of the date. At 4 P. M. it was taken out to graze for an hour or two before dark.

The following general observations were made during the day:

1. Several of the sheep in the corral which seemed normal would show mild characteristic symptoms if suddenly alarmed by a shout or the rapid approach of an attendant.

2. Some of the mildly affected of the forenoon had sufficiently recovered by afternoon to walk out and graze with the band.

3. Some cases in the afternoon were still on their sides unable to rise, others could rise upon their hind limbs, support themselves in front on their knees and thus shuffle along.

4. Blood-letting from the angular veins of the eyes appeared in many cases to shorten or, at least, alleviate the initial convulsions. In other instances it was not productive of any decided improvement. Morphine sulphate (2–5 gr. tablets) hypodermically, was tried on 5 animals with quieting effects in 3 cases. This medicament was not, however, given a fair test.

5. The time elapsing between possible feeding on the golden-rod and the exhibition of symptoms is estimated at 12 hours (the shortest interval) and 33 hours (the longest interval).

6. The total number which manifested definite symptoms (some acutely, others mildly) was 45 to 50 head.

7. The day's mortality was 10 head from acute initial symptoms and 5 head during the next two days from neurasthenia, decubitus and paralysis.

The vegetation of the area grazed by the band since its arrival on the meadows was examined. Special attention was given to the section on which the sheep had browsed during the day immediately preceding the poisoning of the band. The only weeds which had been extensively cropped were the willows (a plant which all stock in this state eat with impunity) and the golden-rod. The cat's tail rushes were practically untouched.

Golden-rod stems and leaves from this source were collected for a feeding experiment. Roots were not selected as there was no evidence that they had been eaten.

Feeding experiment.—The subject was a 6 or 7 months Hampshire ewe lamb. The material fed was 500 grams of a mixture of leaves and stalks of the golden-rod (*Solidago spectabilis*). The animal was confined in a plant free pen fenced with wire-netting with no access to food of any kind for 18 hours prior to the commencement of experimental feeding.

At 10:30 A. M., October 16th, hand-feeding was begun. After receiving a few mouthfuls of the plant the lamb ate a considerable quantity voluntarily and with relish. In fact, most of the 500 grams of the plant collected the afternoon before and thus fed in a comparatively fresh condition was eaten in a natural way. The last mouthfuls were given by hand and eaten at 6:30 P. M. of the same day.

The lamb was not kept under observation during the night, hence an interval of 15 hours elapsed between the final feeding period and the hour (9:30 A. M. the next day) at which the first observations were made.

At 9:30 A. M., October 17th—23 hours after the commencement of feeding and 15 hours after the final feed—salivation was noticed accompanied by incessant motion of the lips and jaws. There was also continuous quivering of the head and ears with intermittent spasms of the skeletal muscles affecting especially the panniculus. The physical result of these simulated closely a rigorous and prolonged natural effort to shake dust from the fleece. At the same time there was some arching of the back with a close-together posture of the legs, (tucked under the body). Excitation of the nervous system was clearly shown. Sudden noises, the shaking of a handkerchief a few feet in front of the face, or a slap on the body would immediately and repeatedly induce a shaking of the fleece as already described. A very evident and interesting feature of these nerve storms was their constant origination in the region of the head with their rapid wave-like passage down the spinal column. Thus the exhibition would commence in the face and head, then involve the neck and trunk and finally the limbs (the anterior always before the posterior). The spasms would also lose intensity as the wave passed away from the brain, so much so that the posterior limbs were never so forcibly affected.

At 10:20 A. M. the animal without any apparent external stimulus was seized with mania, sprang into the wire-netting fence, rebounded to her feet, bolted across the pen in the opposite direction and colliding with a wooden box fell to the ground in convulsions. She was immediately bled from the angular veins of both eyes and ten minutes later given subcutaneously 1–2 grain morphine sulphate combined with 1–10 grain atropine sulphate. This preliminary treatment subdued the convulsions in 15 to 20 minutes except for an occasional twitching of the muscles of the limbs and neck. At 1 P. M. (about 2½ hours after the initial convulsions and their arrest) the lamb was again seriously convulsed and badly bloated. Massage of the rumen produced an eructation of large quantities of flatus.

At 2:30 P. M. the convulsions were still so intense that at 3:10 P. M. 45 grains of chloral hydrate in 2 ounces of water were given as an enema. This quieted the animal slightly, but not sufficiently, hence at 3:30 o'clock 90 grains of chloral hydrate in 8 ounces of water were administered by the mouth. In 15 minutes the lamb was in profound narcosis and remained so until 7:45 P. M. and later when she was put away, still asleep, for the night. At 7:45 o'clock the respiration was normal in frequency but stertorous and the pulse quiet.

At 8 A. M., October 18th, the animal was still alive but weak and staggering. A drench of milk, eggs and brandy was given.

In the afternoon she was able to walk in a staggering manner, would eat sprays of alfalfa given by hand. She was too weak to crop her own fodder. Apart from the ophthalmitis produced by traumatism when in convulsions there seem no disturbance or aberration of vision.

From this date the lamb made a slow but successful recovery.

The incident on the meadows and the feeding experiment were soon found to have a direct bearing upon the unsolved mystery of the previous January which involved the same band when hay-fed at the home ranch.

When the results were concluded and made known to the owner, he quickly realized the connection with the January occurrence, for, as he stated, the hay then fed had been cut from the same meadows.

On March 1st, 1916, Dr. Harry W. Jakeman was deputed to investigate the cause of mortality in a band of 1800 sheep in the eastern part of the state.

From January 20th to the date of his arrival (March 1st) 175 head had died—the daily mortality being from 2 to 5.

Several sick sheep were examined and two autopsies performed. The symptoms were of a nervous type. Apparently there was early disturbance of vision; then champing of the jaws and salivation; locomotion unsteady and incoordinate; twitching of the muscles; great physical weakness resulting in decubitus followed by paresis and death usually in 5 to 7 days.

The autopsies showed in both cases a congestion of the pia mater and a softening of the anterior portion of the cerebrum, especially, the olfactory lobes and extending to the optic thalami. No other gross pathological changes were present.

The symptoms so strongly suggested golden-rod poisoning that the hay on which the sheep were wintering was examined. Unfortunately the stack was then practically finished and only small fragments of fodder were available for examination. Inquiry, however, revealed the following facts:—

1. That deaths among the sheep commenced in January, soon after feeding them hay from a stack which had been harvested from a field where golden-rod grew in more or less profusion.

2. That several sheep had died with similar symptoms in the fall when grazing in the same field.

Conclusions. (1) It would appear from this incomplete and brief study of three field instances that western golden-rod (*Solidago spectabilis*) is a plant possessing definite nerve-poisoning properties, both in its natural green condition and when cured in hay.

(2) The symptoms produced may be acute (maniacal), subacute (producing slight cerebral stimulation and increased normal reflexes) or chronic (resulting finally in mental depression, ataxia and palsy). These appear to depend upon the amount of the plant ingested in a given period of time.

(3) 500 grams eaten in eight hours produced within 23 hours a severe type of poisoning in a 6-7 months lamb.

(4) Chloral hydrate in proper dosage would seem indicated as an antidote. The administration of 45 grains per rectum followed in 20 minutes by 90 grains per os was excessive in the case of the experimental lamb of 6-7 months of age. This animal remained too long under the effect of the drug, and the after-stupor produced would in field practice militate against the chances of recovery under herd conditions.

(5) Strychnine sulphate or general cerebral and motor stimulants, although not tested by me in any of the cases cited, would seem strongly indicated in cases affected chronically or in the stage of weakness and palsy.

CHLOR-ANTISEPTICS

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Students of comparative medicine are at this time more or less interested in the Carrel wound treatment method, and no doubt its use in this country would be more extensively applied if veterinarians were more acquainted with the antiseptic employed, i.e., some efficient modification of Dakin's solution. The purpose of this paper is to stimulate discussion on this subject, therefore a brief review of the more important so-called "chlor-antiseptics", with the presentation of the technique for the preparation of a neutral Dakin solution modified will be considered.

Calx chlorinata, (U. S. P.) also known as chlorinated lime, bleaching powder, chlorinated calcium oxide, and improperly called "Chloride of Lime", is represented by the formula, $Ca(Clo)Cl$. This compound is derived from the action of chlorine upon calcium hydroxide, $Ca(OH)_2+Cl_2=Ca(Clo)Cl+HOH$. It is a bleaching agent, deodorizer, and a powerful germicide. Because of its alkalinity it is very destructive to tissues. It should be kept in tightly closed containers because of the rapid deterioration which takes place through the liberation of chlorine when the compound is exposed to the air. As obtained on the market, calx chlorinata may vary in its available chlorine content from a trace to thirty per cent., the latter strength being that required by the U. S. P. In the presence of water which generally contains some CO_2, the following reaction may occur: $2Ca(Clo)Cl+H_2CO_3=CaCl_2+CaCO_3+2HClO$. (Hypochlorous acid, HClO, is one of the most powerful disinfectants known, being very potent against organisms and their spores, is very penetrating, increases the flow of lymph, does not injure tissues, and is not toxic through absorption.) The hypochlorous acid in the presence of organic material may be broken down into hydrochloric acid and oxygen. 2HClO

$=2HCl+O_2$. The chlorine in the hypochlorous acid constitutes the "available" chlorine. The hydrochloric acid may further react on the calcium carbonate. $2HCl+CaCO_3=CaCl_2+CO_2+HOH$, etc.

Calx chlorinata is the basis of many medicinal preparations. One part of calx chlorinata to ten parts of boric acid may be used as a wound dressing. The dressing may be changed in 48 hours, unless much secretion is present when the dressing may be changed in 24 hours.

Liquor calcis chlorinata (B. P.) is an aqueous solution of calx chlorinata, and when fresh should yield 3 per cent. of available chlorine.

Liquor potassae chlorinatae, or Javalle water is a disinfectant. It is prepared from potassium carbonate, calx-chlorinata, and water.

Liquor sodae chlorinatae (U. S. P.) or Labarraque's solution is made from monohydrated sodium carbonate 70 gm., calx chlorinata 100 gm., and water a sufficient quantity to make 1,000 mils. It should contain at least 2.5 per cent. of available chlorine. The reaction may be stated as follows: $2Ca(Clo)Cl+2Na_2CO_3=2CaCO_3+2NaCl+2NaClO$.

Labarraque's solution has been modified in many ways in an effort to obtain an ideal antiseptic solution free from toxic or irritating properties; it having been proved that Labarraque's solution, Javelle water, and the hypochlorites on the market are too irritating due to alkali or to free chlorine.

Dakin worked on this problem and announced a neutral solution of hypochlorous acid less irritant in action than calcium or sodium hypochlorite, or an acid solution of hypochlorites. His solution is said to be made as follows: "200 gm. of chlorinated lime are added to 10 litres of water in which 140 gm. of anhydrous sodium carbonate have been dissolved. The mixture is strongly agitated, allowed to settle one-half hour, when the supernatant fluid is siphoned off from the precipitate of calcium carbonate and then filtered through cotton. Boric acid (25 to 40 gm.) is added to the clear liquid to neutralize it, using phenolphthalein as an indicator." This solution when fresh was said to kill pyogenic organisms in 2 hours. Dakin thought that the germicidal action of calx chlorinata was increased due to hypochlorous acid, that the new antiseptic was neutral, non-irritating, and could be used in greater concentration than calx chlorinata. It was said that boric

acid also increased the activity of calx chlorinata. His solution soon proved to be very irritating, eroding the skin when applied by the continuous drip method, and caused great pain and agony of the patients. It was also shown that while the alkalinity of the solution was neutralized by the use of the boric acid thus causing less irritation, the antiseptic action was inhibited. One author obtained poor results clinically, and claimed that microorganisms actually developed in wounds treated with the so-called Dakin solution, and in some instances requiring secondary resections to be made. Delbet believes that hypochlorites act on the albumen molecule in such a way as to render it susceptible to attack by germs.

It will be seen that Labarraque's and Dakin's solutions are obtained by the same process, excepting in Dakin's solution the original alkali of the solution is neutralized with boric acid. This has led one author to suggest the following:

"Solution of Chlorinated Soda, U.S.P. IX	200 gm.
Sterile Water	800 mils.
Boric Acid	4 gm.

Dissolve. Keep in well stoppered bottles in a cool place protected from the light".

Dr. L. A. Stimpson in The Journal of the A.M.A. for December 2, 1916, states that in relation to Dakin's solution that "the unsatisfactory results sometimes obtained by the use of the original preparation, and the disfavor which it has acquired in the hands of some surgeons are probably due to imperfections in the product, such as the persistence of alkalinity. Some of the wounds which I saw in various hospitals under the treatment were brown and unnatural in appearance, while all the Compiégne were rosy and apparently entirely free from pus. The wounds were there kept constantly wet with the solution, which was introduced through tubes and poured on the surface every two hours." He gives the following formula which he obtained from Dr. Carrel during May 1916, as an improvement over the original solution:

"PREPARATION OF HYPOCHLORITE SOLUTION (DAKIN)

1.	Chlorinated lime (bleeching powder)	200 gm.
	Sodium carbonate, dry.............	100 gm.
	Sodium bicarbonate	80 gm.

2. Put the chlorinated lime in a 12-liter flask with 5 liters of ordinary water, and let it stand over night.

3. Dissolve the sodium carbonate and bicarbonate in 5 liters of cold water.

4. Pour (3) into the flask containing (2), shake it vigorously for a minute, and let it stand to permit the calcium carbonate to settle.

5. After half an hour siphon off the clear liquid and filter it through paper to obtain a perfectly limpid product. This must be kept protected from the light.

The antiseptic solution is then ready for surgical use; it contains about 0.5 gm. per cent of sodium hypochlorite with small amounts of neutral soda salts; it is practically isotonic with blood serum. It should meet the following tests:

TEST.—Put about 20 c.c. of the solution in a glass and pour on its surface a few centigrams of phenolphthalein in *powder;* shake it with a circular movement, as in rinsing; the liquid should remain colorless. A more or less marked red discoloration indicates the presence of a notable quantity of free alkali, or incomplete carbonation, imputable to an error in technique.

ERRORS TO BE AVOIDED.—Never heat the solution. If in an emergency it is necessary to triturate the chlorinated lime in a mortar, do so only with water, never with the solution of the soda salts.

TITRATION.—To 10 c.c. of the solution add 10 c.c. of distilled water, 2 gm. of potassium iodid and 2 c.c. of acetic acid. Pour into this mixture a decinormal (2.48 per cent) solution of sodium thiosulphate (hyposulphite) until it is decolorized. The number of cubic centimeters of thiosulphate employed multiplied by 0.03725 equals the percentage of sodium hypochlorite in the solution."

The following technique is that used in the hospital of Dr. A. Carrel, Hospital Temporaire 21, Rond-Royal, Compiégne, France. This technique was furnished by Dr. Carrel to "The Journal of the American Medical Association" and is found in that journal Vol. LXVII, No. 24, page 1777, December 9, 1916:

"Preparation of Dakin's Solution (Daufresne's Technic)

Dakin's solution is a solution of sodium hypochlorite for surgical use, the characteristics of which, established after numerous tests and a long practical experience, are as follows:

(A) Complete Absence of Caustic Alkali.—The absolute necessity for employing in the treatment of wounds a solution free from alkali hydroxid excludes the commercial Javalle water, Labarraque's solution, and all the solutions prepared by any other procedure than the following:

(B) Concentration.—The concentration of sodium hypochlorite must be exactly between 0.45 and 0.50 per cent. Below 0.45 per cent. of hypochlorite the solution is not sufficiently active; above 0.50 per cent. it becomes irritating.

Chemicals Required for the Preparation.—Three chemical substances are indispensable to Dakin's solution: chlorinated lime, anhydrous sodium carbonate and sodium bicarbonate. Among these three products the latter two are of a practically adequate constancy, but this is not the case with the first. Its content in active chlorine (decoloring chlorine) varies within wide limits, and it is absolutely indispensable to titrate it before using it.

Titration of Chlorinated Lime.—There must be on hand for this special purpose:

A 25 c.c. buret graduated in 0.1 c.c.
A pipete gauged for 10 c.c.
A decinormal solution of sodium thiosulphate (hyposulphite).

This decinormal solution of sodium thiosulphate can be obtained in the market; it can also be prepared by dissolving 25 gm. of pure crystalline sodium thiosulphate in 1 liter of distilled water, and verifying by the decoloration of an equal volume of the decinormal solution of iodin by this solution. The iodin is prepared by dissolving 1.27 gm. iodin and 5 gm. potassium iodid in 100 c.c. of water.

The material for the dosage thus provided, a sample of the provision of chlorinated lime on hand is taken up either with a special sound or in small quantities from the mass which then are carefully mixed.

Weigh out 20 gm. of this average sample, mix it as completely as possible with 1 liter of ordinary water, and leave it in contact for a few hours, agitating it from time to time. Filter.

Measure exactly with the gauged pipet 10 c.c. of the clear fluid; add to it 20 c.c. of a 1:10 solution of potassium iodid and 2 c.c. of acetic or hydrochloric acid. Drop, a drop at a time, into this mixture decinormal solution of sodium thiosulphate until decoloration is complete.

The number of cubic centimeters of the hypochlorite solution required for complete decoloration, multiplied by 1,775, gives the weight of the active chlorine contained in 100 gm. of the chlorinated lime.

This figure being known, it is applied to the accompanying table, which will give the quantities of chlorinated lime of sodium carbonate and of sodium bicarbonate which are to be employed to prepare 10 liters of Dakin's solution.

QUANTITIES OF INGREDIENTS FOR TEN LITERS OF DAKIN'S SOLUTION

Titer of Chlorinated Lime	Chlorinated Lime Gm.	Anhrydrous Sodium Carbonate Gm.	Sodium Bicarbonate Gm.
20	230	115	96
21	220	110	92
22	210	105	88
23	200	100	84
24	192	96	80
25	184	92	76
26	177	89	72
27	170	85	70
28	164	82	68
29	159	80	66
30	154	77	64
31	148	74	62
32	144	72	60
33	140	70	59
34	135	68	57
35	132	66	55
36	128	64	53
37	124	62	52

Example: If it required 16.6 c.c. of the decinormal solution of the sodium thiosulphate for complete decoloration, the titer of the chlorinated lime in active chlorin is:

$$16.6 \times 1.775 = 29.7 \text{ per cent.}$$

The quantities to be employed to prepare 10 liters of the solution will be in this case:

Chlorinated lime ....154 gm.
Dry Sodium carbonate .... 77 gm.
Sodium bicarbonate .... 62 gm.

If crystalline sodium carbonate is being used, then instead of 80 gm. of dry carbonate it must be replaced by: crystalline sodium carbonate....220 gm.

Preparation of Dakin's Solution.—To prepare 10 liters of the solution:

1. Weigh exactly the quantities of chlorinated lime, sodium carbonate and sodium bicarbonate which have been determined in the course of the preceding trial.

2. Place in a 12-liter jar the chlorinated lime and 5 liters of ordinary water, agitate vigorously for a few minutes, and leave in contact for from six to twelve hours, over night, for instance.

3. At the same time dissolve, cold, in the five other liters of water the sodium carbonate and the bicarbonate.

4. Pour all, at once, the solution of the sodium salts into the jar containing the maceration of chlorinated lime, agitate vigorously for a few moments, and leave it quiet to permit the calcium carbonate to settle as it forms. At the end of half an hour, siphon the liquid and filter it through double paper to obtain an entirely limpid product, which must be protected from light.

Light, in fact, alters quite rapidly solutions of hypochlorite, and it is indispensable to protect from its action the solutions which are to be preserved. The best way to realize these conditions is to keep the finished fluid in larger wicker-covered demijohns of black glass.

Titration of Dakin's solution.—It is a wise precaution to verify, from time to time, the titer of the solution. This titration utilizes the same material and the same chemical substances as are used to determine the active chlorine in the chlorinated lime:

Measure out 10 c.c. of the solution, add 20 c.c. of 1:10 solution of potassium iodid, and 2 c.c. of acetic or hydrochloric acid. Drop, a drop at a time, into this mixture a decinormal solution of sodium thiosulphate until decoloration is complete.

The number of cubic centimeters employed multiplied by 0.03725 will give the weight of the sodium hypochlorite contained in 100 c.c. of the solution.

A solution is correct when, under the conditions given above, from 12 to 13 c.c. of decinormal thiosulphate are required to complete the decoloration.

$$13 \times 0.03725 = 0.485 \text{ per cent. of } NaOCl.$$

To Test for the Alkalinity of Dakin's Solution.—It is easy to differentiate the solution obtained by this procedure from the commercial hypochlorites and from Labarraque's solution:

Pour into a glass about 20 c.c. of the fluid, and drop on a surface a few centigrams of phenolphthalein in powdered form. Dakin's solution, correctly prepared, gives absolutely no change in tint, while in the same condition Javelle water and Labarraque's fluid give an intense red coloration which indicates in the latter two solutions the presence of free caustic sodium.

Apparatus Required for Sterilization of Wounds:—1. One liter bottles, the lower opening with an anterior diameter of 7 mm.

2. Distributing tubes with one, two, three or four branches (Gentile).

3. Connecting tubes: (a) cylindric tubes, 2.5 cm. long, interior diameter 4 mm.; (b) cylindric tubes, 4 cm. long, interior diameter, 7 mm.; (c) Y tubes, interior diameter, 7 mm.

4. Mohr pinch-cocks.

5. Irrigating tubes. Drain tubes No. 30 (interior diameter, 7mm.).

6. Connecting tubes. Drain tubes No. 16 (interior diameter, 4 mm.), closed at one end. Above this end these tubes are perforated with holes from 0.5 to 1 mm. in diameter:

(a) Tubes perforated for 5 cm., 30 cm. long; (b) tubes perforated for 10 cm., 30 cm. long; (c) tubes perforated for 15 cm., 40 cm. long; (d) tubes perforated for 20 cm., 40 cm. long."

The following is a Dakin solution as modified by Carrel, and further modified by Dr. R. W. Corwin, M.D., Chief Surgeon of the Minnequa Hospital, Pueblo, Colorado. Dr. Corwin studied the treatment of war wounds in Europe:

To Make Neutral Dakin Solution: Preliminary: Weigh 5 gm. chlorinated lime. Macerate in water and dilute to 500 c.c. Shake and leave standing over night.

To determine percentage of active chlorine: Take 25 c.c. of the above solution and titrate with normal 10th arsenous acid solution.

To determine percentage of calcium salts soluble in water: Take 100 cc. of the above solution. Decant. Add water to the residue. Heat and filter. Determine the percentage of calcium by precipitating with ammonium oxalate. Filter. Add sulphuric acid. Titrate with normal 10th potassium permanganate. Calculate from this the exact amount of sodium carbonate necessary to precipitate the entire amount of calcium in solution, thereby making an absolutely neutral solution.

Chlorinated lime: 200 gm. and the calculated amount of sodium carbonate, plus 80 gm. of sodium bicarbonate.

Dissolve the chlorinated lime in 5 liters of water, and let stand over night.

Dissolve the sodium carbonate and bicarbonate in 5 liters of water (i. e. the amount necessary to make a 0.45 to 0.5 per cent solution of sodium hypochlorite).

Add to the chlorinated lime solution, the carbonate and bicarbonate solution. Stir well. Let stand 30 minutes. Filter. This solution must be kept in a dark place."

In using it he states that "we apply the solution to every part of the wound. If there be any pockets in which the solution cannot enter, pus will form and, of course, reinfect the wound. We take smears from the bottom of the wound every day and if we find no germs for about three or four days, then we unhesitatingly close the wound."

CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."

TRAUMATIC CARDITIS IN A BUFFALO BULL

W. Graham Gillam, M.R.C.V.S.
Veterinary Inspector, Health of Animals Branch
Department of Agriculture, Canada.

A four-year-old buffalo bull was noticed to be in poor health, rather emaciated and lacking in his usual vitality. Upon my advice he was removed from the herd and placed in a corral, where he could be more closely observed and receive special care. Three days later the attendant went into the corral to feed him, when the bull immediately attacked him and threw him twice. What happened after this it is impossible to ascertain, as no observers were present, but when the attendant recovered his senses he found the bull lying dead.

The following day a postmortem examination was made; the temperature being 30° below zero, and the carcass out of doors, a very close examination was impossible, but the following conditions were noted:

Carcass. Emaciated.

Abdominal Viscera. Normal, with the exception of the rumen abomasum, which had deep patches of congestion and blood extravasation, particularly at the pyloric end of the rumen; here there was a small perforation large enough for the admission of the small finger.

Diaphragm. A similar perforation at the area contiguous to the rumen, with a small patch of peritonitis surrounding it about six inches in diameter.

Lungs. Congested.

Heart. Penetrating the left ventricle and extending upwards and slightly forwards was a splinter of spruce wood (probably from a fence-post) which had passed through into the left auricle, emerging at its upper surface, as shown in the appended rough sketch. This piece of wood was about 8½ inches in length and about ¾ of an inch broad at its widest part, narrowing to a sharp point at its penetration end. The perforation of the auricle had become sufficiently large to admit the middle finger.

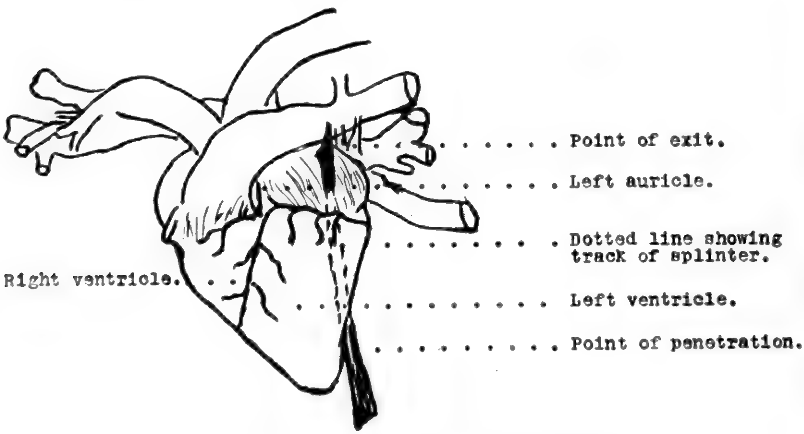

FIG. 1. Heart of Buffalo Bull with Splinter

Pericardial Sac. This contained a large quantity of semi-coagulated blood, and a large quantity of blood had escaped into the thoracic cavity. I thoroughly examined the carcass for tubercular lesions and found no trace of any.

Conclusions. Death was due to hemorrhage from the heart; the emaciation I considered was due to indigestion from gastritis, set up by the irritation caused by the presence of the foreign body in the rumen and the extension of the area of congestion to the abomasum. Judging from the appearance of the splinter and the condition of the heart I am of the opinion that it had been there some time, and it is a practical conclusion that the presence of the splinter gave rise to the cough, which, coupled with the dyspnoea and the emaciation, led me to think that the case might be one of

tuberculosis, particularly as I had already made an autopsy on a positive case from this herd.

On the day on which the animal died, the most feasible theory to account for the sudden death is, that while the splinter was still in the heart no great hemorrhage took place, until under excitement and extra exertion, the splinter eventually punctured the outer wall of the auricle and hence the hemorrhage which was directly responsible for death.

NOTE:—The Dominion of Canada maintains at Wainwright, Alberta, the largest herd of wild buffalo in existence, numbering several hundred. It was in this herd the above case occurred.

CHRONIC EFFUSIVE PLEURISY. CAUSE UNKNOWN

R. R. BOLTON, Ames, Iowa.

On December 4th, 1916 a bay mare, 9 years of age was led into the hospital, a distance of seventeen miles.,The owner's reason for bringing the mare to us was that since she had foaled last spring she had been very dull and depressed, and had remained poor and was very easily exhausted.

The veterinarian in attendance had dressed her teeth once or twice and had prescribed some powders from which she derived no apparent benefit. Additional history informed us that the mare had never entirely refused to eat but that she had not had a good appetite. She had been worked all summer, but not at hard work, and was continually dull and stupid. The mare had never been known to be sick with an acute disease.

Symptoms:—Observed one hour after arrival at the hospital. Respiration 60; pulse 62; temperature 104.3°. Animal in poor condition. Hair coat dry, lustreless and erect. Skin dry, inelastic and hidebound.

Respiratory System: Respiration rapid and very shallow. Nostrils widely dilated. Respirations mostly abdominal in type.

The thorax was asymmetrical in shape, the left side being slightly larger than the right. Auscultation of thorax revealed absence of any sounds over the lower part on each side.

Percussion outlined a dull area in the lower part of the thorax bounded above on the left side by a horizontal line. The dull area on the right side could not be determined to be bounded above by a

horizontal line but by a line curved somewhat convexly. On placing the animal in an inclined position with the fore parts elevated, the line bounding the area of dullness on the left side was noted to change position and remain horizontal.

Percussion over the dull areas was somewhat painful.

Circulatory System: Examination of the circulatory system revealed an accelerated but strong pulse, and the mucous membranes showing a mild degree of cyanosis. The peripheral veins were distended and especially the external thoracic veins.

Abdomen somewhat enlarged, pot-bellied and pendulous. Intestinal peristalsis apparently normal. Feces passed in normal amounts but in somewhat hardened and shiny pellets. Urination occurred frequently and in very small amounts.

Diagnosis: Chronic effusive pleurisy. Applied the ophthalmic mallein test which gave a negative reaction as observed the following day. Dec. 5, 1916:—Respiration 37; pulse 40; temperature 100.8°. Respiration remained rapid and shallow and slightly labored as shown by dilation and movement of the nostrils.

Pulse and temperature had returned to normal. Appetite was good but the patient was depressed.

Dec. 6, 1916:—Respiration 36; pulse 39; temperature 100.8°. Respiratory symptoms remained in evidence. Patient remained depressed.

Dec. 7, 1916:—Respiration 38; pulse 42; temperature 101.2°. Respiratory symptoms remained in evidence. Patient still depressed.

Performed thoracentesis on the left side in the 7th intercostal space 1½ inches above the costal cartilages and withdrew 3800 cubic centimeters of fluid. This fluid was clear, amber colored and serum-like. On allowing it to stand a very abundant light gray sediment fell. Cultures made from the fluid upon the ordinary culture media remained sterile.

Microscopic examination showed an abundance of polymorphonuclear leucocytes in a more or less degenerated condition, some endothelial cells and some fibrin. The fluid was of an inflammatory character. A chemical analysis of the fluid showed the following: Specific gravity 1028. Reaction neutral to litmus. Total solids 6.5 %. Albumin 90%. The remaining 3.5% was not determined.

December 8, 1916:—Respiration 30; pulse 38; temperature 100.6°.

Respiration slightly improved. Administered the tuberculin test injecting 5 cubic centimeters of tuberculin subcutaneously with the following results:

Preinjection		Injection	Post Injection Temperature					
1 P. M.	6. P. M.	11 P. M.	7 A. M.	9 A. M.	11 A. M.	1 P. M.	3 P. M.	5. P. M.
100.6°	101.4°	5 c.c.	100.4°	101.°	100.6°	101.2°	100.6°	100.6°

The reaction was negative.

Dec. 9, 1916:—Respiration 32; pulse 39; temperature 100.6°. A hot and painful edematous swelling about the size of a lemon was present at the point of injection of the tuberculin. It remained for 48 hours. A similar swelling occurred at the point of injection in another horse used as a control to the subcutaneous tuberculin test.

Dec. 10, 1916:—Respiration 32; pulse 38; temperature 100°. Symptoms remained unchanged.

Dec. 11, 1916:—Respiration 39; pulse 45; temperature 101.2°.

Dec. 12, 1916:—Respiration 33; pulse 42; temperature 101.1°.

Symptoms remained unchanged. Ophthalmic tuberculin test applied and found negative. Thoracentesis was repeated at same point as before and only about 150 cubic centimeters of fluid obtained. Two guinea pigs were injected, each receiving one cubic centimeter of the exudate intraperitoneally. One pig died at end of 48 hours. Cause of death could not be determined. The second pig has remained healthy.

Dec. 13, 1916:—Respiration 30; pulse 42; temperature 101.2°.

The following prescription was filled and instructions given to repeat the treatment daily for one week:

℞ Potassi acetatis ounce 1
F. E. Digitalis dram 1
M. et Ft. Solutio.
Sig: Give at one dose.

Dec. 14, 1916:—Respiration 20; pulse 42; temperature 101.2°.
Dec. 15, 1916:—Respiration 26; pulse 39; temperature 101.0°.
Dec. 16, 1916:—Respiration 26; pulse 39; temperature 100.3°.
Dec. 17, 1916:—Respiration 24; pulse 40; temperature 100.4°.
Dec. 18, 1916:—Respiration 24; pulse 36; temperature 100.9°.
Dec. 19, 1916:—Respiration 30; pulse 36; temperature 100.9°.
Dec. 21, 1916:—Respiration 28; pulse 38; temperature 101.8°.

An unfavorable prognosis was given and the animal was left to be destroyed.

Discussion: The owner's chief complaint was that this animal became exhausted too easily when at work, although she appeared to be fully able to work. When such a complaint is entered against a horse that appears in every other way fully capable of doing work we may at once direct our attention to an examination of the respiratory and circulatory systems with the expectation of finding the reason for being easily exhausted.

A study of the respiratory frequency, pulse frequency and temperatures as observed daily with the animal at rest showed that the respiratory frequency was greatly accelerated while the pulse frequency and temperature remained normal. We therefore concluded that the function of respiration was most seriously deranged and that the respiratory disturbance was the cause of the animal's inability to work. The respirations were also very shallow. The causes of accelerated and shallow respirations may be enumerated as follows:

(1) Diminished working—breathing surface of the lungs, as observed after solidification of large parts of the lung in pneumonia.

(2) Decreased negativity of the intrathoracic pressure. This causes a smaller amount of air to be taken in at each inspiration and is observed in pneumothorax, hydrothorax, effusive pleurisy and when great pressure is exerted against the diaphragm by distended abdominal organs (meteorism and tympany).

(3) Adhesions between the parietal and visceral pleurae or between the diaphragm and adjoining organs.

(4) Intense pain caused by respiratory movement as in acute fibrinous pleurisy, or rheumatism of the intercostal muscles.

The immediate causes operating to produce the respiratory disturbance in this case as determined by physical examination were as follows:

(2) Decreased negativity of the intrathoracic pressure from the presence of the fluid exudate in the thoracic cavity.

(3) Adhesions between the parietal and visceral pleurae or between the diaphragm and adjoining organs.

Autopsy: On January 20, 1917 the animal was killed and a post mortem examination made. From the pleural and peritoneal cavities there escaped several gallons of an amber colored fluid

exudate similar to that taken from the pleural cavity and described above.

The entire parietal and visceral serosa of both the pleural and peritoneal cavities was slightly thickened and also thickly beset with patches of fibrous connective tissue. The patches varied in size from as large as a kernel of wheat to the area of the palm of the hand. Some were in tufts, pale in color and cicatricial in character showing that they were of long standing, or that they had become completely organized. Others were much younger or still in the acute stage undergoing organization. These were congested and deep red in color, very vascular, soft, and velvety.

The diaphragm was extensively and firmly adhered to the lungs anteriorly and posteriorly to the liver, stomach and diaphragmatic flexure of the great colon so that no separation could be made.

The visceral pleura was uniformly thickened so that the lungs appeared to be encased in a capsule or fibrous connective tissue. The lungs had adhered to the parietal pleura in only a few places. The parenchyma of the lungs appeared normal. The pericardial sac was covered almost completely with a layer of deep red, very vascular, soft and velvety exudate undergoing organization. The heart muscle appeared a little pale and flaccid.

The mucosa of the large intestine was studded with larvae of the sclerostome.

The lymph glands of the body were enlarged and congested.

One horn of the uterus was enlarged and the wall was flabby. The mucosa showed many patches of petechial hemorrhages. No evidence as to the primary lesion could be determined.

History related that the mare had never been known to be sick with an acute disease.

From the post mortem findings we drew the conclusion that some infectious organism of low virulence had gained access to the serous membranes (peritoneum or pleura) and had spread over these membranes by means of the lymph stream setting up here and there foci of inflammation of a sero-fibrinous character, the fibrin later becoming organized into cicatricial tufts and fibrous connective tissue, and the serum accumulating in the pleural and peritoneal cavities. It seems altogether probable that the infection may have gained entrance to the serosa at the time of parturition as the history related the malady to have started with that event.

DYSTOCIA FROM MULTIPARITY

JAMES A. WAUGH, V.S., D.V.M., Pittsburgh, Pa.

Patient, thoroughbred Holstein cow; third pregnancy, and full term. History: cow found early in morning, face and front feet of calf presenting, and unable to deliver; neighbors—dairymen and farmers—called in to assist owner, an Austro-Italian on rented farm. They applied ropes, and used small compound pulleys, and worked unsuccessfully for seven hours, then called me. I had two hours between trains to my credit, and drove two miles in the country with a slow horse, and managed to make my train back to the city—hence rapid work required. I found cow down in bank barn—stable somewhat dark—and unclean—so removed her to the horse section for better light and cleaner space. Entire loss of appetite during suffering. Laid down again as soon as we removed her. Observed face of calf seemed small for this breed, and surmised a monstrosity; lower paw had been pulled away. Disinfected with mild creolin solution and pumped a gallon into uterus; examined, as far as knees, and found those were front feet presenting, and already secured with ropes; incised skin around fetlock joint, and pushed the skin backward and upward, and applied force to the rope attached to the foot, and soon extracted the entire limb including the scapula, then reapplied the same method to the other limb, with like results; next applied traction to the neck rope already attached back of the head, and soon delivered the calf with four feet, which was a great surprise to all present, as we already had two limbs lying on the floor. Owners were alarmed and afraid they would lose the cow, but I assured them we would be successful. Examined and found the other calf's neck was bent downward with the head resting under the shoulder of that side; got my hand in its mouth, and soon straightened the neck; pushed a middle finger into orbital cavity, and an assistant introduced his arm and hand, and used his finger likewise, and extended the head, thus enabling us to attach a rope around the neck, and delivery was soon completed. Placenta was removed, and uterus was douched with warm permanganate of potash solution. Cow was now eating hay, and we gave two pails of water, followed by a dose of soda bicarb, nux vomica pulv., and zingiberis rad, pulv. Recovery was rapid, and satisfactory.

Remarks. These cases are described elaborately in our text books, but this case is of interest owing to its rarity and simplicity of management when understood.

REMARKS ON APPARATUS, TECHNIQUE, AND INTRA-VASCULAR INJECTION OF EMBALMING FLUID

JAS. D. GROSSMAN, D.V.M. AND T. S. LEITH, D.V.M.
Ames, Iowa.

The detail of intravascular injection of embalming fluids, as well as technique and apparatus has been described by Dr. F. A. Lambert of O.S.U. in volume XLIX, June 1916, *Journal of the American Veterinary Medical Association.*

The modifications of the above methods we wish to give are

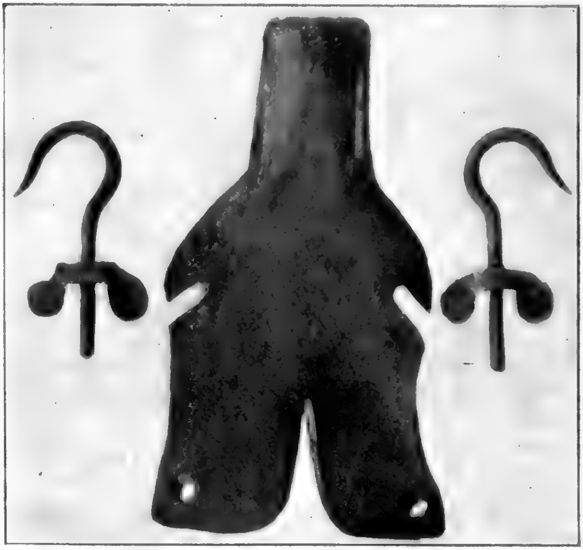

FIG. 1. Iron plate and hooks

ones which have been worked out in the anatomical laboratory of the Iowa State College and are now in use here.

The apparatus we use is the same as mentioned in the above article with the exception of the head chains and the tank.

Our apparatus allows the head to be fixed in nearly the normal position (not over extended). It consists of a plate of iron 3/8 inch in thickness, 16½ inches long, 9 inches wide at upper end, 8½

inches at head hooks, 3 inches at lower end which is curved to fit over nasal bones.

Near the lower end in the concavity is a calk to prevent the plate slipping lengthwise or sidewise on the head. The head hooks are $7\frac{1}{2} \times \frac{1}{2}$ inches and have $3\frac{1}{2}$ inch threaded. See Fig. 1.

FIG. 2. Horse embalmed for dissection.

A common head chain is used in the upper end to which the hoist block it attached.

We leave it in position for 3 or 4 days to allow tissues to become well fixed, then it is removed and the subject is suspended by means of ordinary head chains.

We use a common irrigating tank of 2 gallons capacity suspended by a rope and pulley from the ceiling to gravitate the liquid into the subject. This enables us to regulate the pressure of liquid for large and small animals by raising or lowering the irrigating tank.

The most of our dissecting is done in the upright position, therefore we endeavor to fix the legs with the joints extending as

in the normal standing attitude which has many advantages in studying the topography of the structures.

The carpal and stifle joints are held in position until fixation is sufficient to hold them, thereby obtaining the normal angles of the limbs. The carpal joints are held in extension by placing a truck against them; the stifle is extended and the patella is held in position by the hand as the tissues begin to harden.

The embalming fluid we use consists of straw-colored phenol 3%, formaldehyde, U. S. P. 10% for cold weather, and 15% in warm weather. The straw-colored phenol has solved the mould problem for us quite satisfactorily.

Our method of keeping the parts from drying after embalming is applying thoroughly paraffin oil to the legs and heads, and wrapping with cloths; the cloths are left in place until the parts are to be dissected.

The students are required to apply the paraffin oil to the dissected specimen to prevent evaporation. (Photos by W. M. McLeod).

"PIROPLASMOSIS" "EQUINE MALARIA"

R. A. Stoute, D.V.S., Gov. Vet. Surgeon
Barbados, West Indies.

Brown mare, aged ten years; imported among a cargo from St. Croix. This animal was landed here on January 30, and purchased by me the following day.

Six days later she showed a great distaste for all food.

Two days after, the following well marked symptoms were apparent:

Entire loss of appetite, taking no nourishment, yellowish appearance of conjunctiva, gums, inner part of lip, as well as the lips of the vulva. Tears flowing freely. Intermittent hurried pulse; quickened respiration; temperature 108° F.; great disinclination to move; marked constipation. Respiration very rapid just before death.

Blood smears showed well marked piroplasmosis. This diagnosis has been confirmed by the Bureau of Animal Industry for which I must thank Dr. Melvin.

The question is: How did this disease develop in the West Indies?

If any of your readers can solve this, I shall feel obliged.

ABSTRACTS FROM RECENT LITERATURE

Snoring in a Cow. Dr. Herbert Bibbey, M. R. C. V. S. reports in the *Veterinary Record* that he was called to see a cow which had been snoring some 12 months and was getting worse, notwithstanding the treatment to which she had been submitted. The examination of the cow developed the conclusion that a tumor situated somewhere in the larynx was the cause. An operation was suggested and, after thought, accepted by the owner. The animal was cast and after antiseptic care the larynx opened, after an examination of the fauces by the hand, the animal's mouth being kept well open. Light from an electric lamp and a laryngeal dilator permitted a most thorough inspection of the larynx, but no tumor or other obstruction was discovered. As the cow had been tracheotomized, the opening of the trachea was temporarily closed and the act of respiration watched to see what took place in the larynx. It was then noticed that in the act of expiration the whole membrane of the larynx seemed to come away from the side of the organ and completely close the entrance of air. A portion of the membrane was then excised on each side and the wound closed. When the animal was up only a slight noise could be heard and this disappeared by the next day. Liautard.

Abscess of the Hypophysis in a Cow. A. Salvisberg. *Schweizer Archiv. für. Tierheilkunde,* Vol. 58, p. 708, 1916.—A 5 year old cow had a fetid breath for some time. Examination of the nasal cavity disclosed a wood splinter, probably part of a twig. It was removed with some difficulty, as it stuck fast. Washing with salt solution was the therapy and recovery seemed complete. Two months after removal of the foreign body the cow, while in pasture, began to carry her head high and walk in "parade step". The eyes protruded from their cavities. The milk secretion stopped, likewise there was no rumination; the animal would not eat, and was highly excited. I diagnosed the case as brain abscess and advised slaughter. On autopsy there was found a complete suppurate liquefaction of the hypophysis, extending into adjacent parts of the brain. Berg.

Vesicle Calculi in a Cat. G. Yates, F.R.C.V.S. *Veterinary Journal.*—At various times, this cat had difficulty in passing urine. By catheterization, he was relieved and the administration

of lithontriptic medicine ordered. Later the urine became blood stained and found to contain small gritty particles. Uremic poisoning developed and the cat died. On examination of the carcass the presence of several small calculi in the urethra was detected and the bladder was found to be thickened, devoid of urine and in its mucosa much inflammed were imbedded forty small calculi. The ureters and kidneys were free from lesions.

LIAUTARD.

A CONTRIBUTION TO THE STUDY OF SPIROCHETES IN THE DIGESTIVE TRACTS OF HOGS AND THEIR RELATION TO HOG CHOLERA. P. Bekensky. *Recueil de Médécine Vétérinaire,* Vol. 92, pp. 545-552, 1916.—The well known works of deSchweinitz and Dorset have placed hog cholera among the diseases caused by a filterable virus. In recent years various investigators have found spirochetes in the blood, intestines and cutaneous lesions of hogs affected with cholera. Ruther in 1910, was the first to clearly show the relation between spirochetes and hog cholera infection.

There is no uniformity of opinion regarding the relation between spirochetes found in the intestine and hog cholera. This has led us to study the spirochetes found in the mucosa of the digestive tract of hogs and to attempt to determine their importance in relation to hog cholera.

Our experimental material was the following: cadavers of hogs sent to the laboratory for autopsy, the cecums and rectums of healthy hogs slaughtered at the municipal abattoir in Petrograd, healthy, living hyperimmune hogs, hogs among which there had been an epizootic of cholera, and finally, hogs among which there had been an epizootic of anthrax.

To summarize; in the examination of cholera cadavers, spirochetes were found in a large number of cases, but not in all, (58%); also in live hogs affected with cholera (17%) and on the contrary spirochetes were not found once in hogs affected with erysipelas or anthrax. In suckling pigs that had been artificially infected with the filterable virus, spirochetes were found in practically every case, 17 out of 19.

The results indicate that when hogs are affected with cholera, the spirochetes found in their digestive tracts have a certain etiological significance somewhat similar to that of the other microorganisms which cause secondary infections; but the disease is

fundamentally due to the filterable virus. Spirochetes were not found in hyperimmune hogs. BERG.

NEUROMA OF THE TRIGEMINII—PARALYSIS OF THE MASSETER MUSCLES. R. Hudson, F.R.C.V.S. *Veterinary Journal.* A 2 year old pony was getting thin and inclined to mope about while being turned out. Brought in the stable in order to feed him better, he did not seem to improve much; although he appeared in good condition. His temperature was normal. On examination of the mouth he showed loss of power to grip and the masseters were found paralyzed. The lips were not involved nor the buccinator muscles which are supplied by the 7th pair. The treatment was of strychnia and iodide of potassium which gave no results. The colt died after a fortnight. On examination of the head, an enlargement of the tri-facial nerve was found between the root and the wall of the cranial cavity. The enlargement was of fibrous nature. On one side it was as large as a walnut and on the other a little smaller.

LIAUTARD.

DISINFECTION OF THE HANDS WITH THE HYPOCHLORITES OF LIME AND MAGNESIA. Dubard. *Revue d'Hygiene,* Vol. 38, pp. 892-895, 1916.—A solution was used from which all the lime had been carefully eliminated by an excess of magnesium sulfate. The following solution is used without any untoward effects on the hands; the hypochlorite of lime contains 100 degrees of available chlorine; hypochlorite of lime (bleaching powder) 150 grams; water, 5 liters. To this is added 180 grams of magnesium sulfate.

Technic—Following is the technic which is recommended:

First time—Washing and scraping the hands with sterile water, brush and soap. It is useless to attempt to attain to surgical or bacteriological cleanliness by this alone; it results from the following:

Second time—Disinfection. This is obtained by immersing the hands, (free from their sebaceous coating by soaping) during 4 to 6 minutes in the solution indicated, according to the amount of available chlorine present.

Several months' experience has shown that it is useful, for the purpose of maintaining the integrity of the skin as well as assuring aseptic conditions, to follow the disinfection by giving the hands a light coating of sterile fat; the hands having been previ-

ously immersed in a strong alcohol bath and rubbed dry with a sterile compress.

Third time—The object of this is to prevent the hands from becoming soiled by contact with tissues or fluids of the subject operated on; for this purpose the following mixture is used:

Olive oil or poppy oil; sterile......65 p.
Essence of camphor ....30 p
Essence of origanum, sage, thyme
or mint, ... 4 p

This composition has no irritating action on the most delicate tissues.

Clinical results—Between March and August 1916, we performed 98 operations, using the above technic systematically, and using that only. No accidents occurred. Bacteriological tests were made on epidermal debris, nail clippings, etc., and finger prints on nutritive gelose; all of which showed that the disinfection was superior to that obtained with tincture of iodin.

BERG.

CYSTIC DISEASE OF THE AIR SINUSES. E. Wallis Hoare, F.R. C.V.S. *Veterinary News.*—A one and a half year old filly had been having a nasal discharge for nine months. She snored also and these conditions had grown worse lately. The snoring was loud at rest. The left frontal sinus was bulging, also the superior maxillary. Respiration was carried on through the right air passages. Discharge from the right nostril was fetid. The teeth gave negative evidences. The animal was cast and the superior maxillary sinus of the left side was opened. Fluid gushed out in abundance. The animal was allowed to get up and the escape of fluid was more abundant. The right frontal and maxillary sinuses were opened the next day but were found healthy. These operations were followed by some improvement but there was a relapse. The mare was abandoned to the author, who then reopened the left frontal sinus, low enough to expose the anterior turbinated bone. The mucous membrane was found hypertrophied and freely curetted. Free passage was thus established through the nasal chambers and the nostrils. After some purulent complications and intermittent closing and reopening, with removal of tissues from the nasal chambers, the animal finally got well and was returned to its owner.

LIAUTARD.

A CURIOUS CASE IN A FOWL. Henry Taylor, F. R. C. V. S. *Veterinary Record.*—This is a case which by its history, its relations, symptoms and postmortem lesions, revealed an intoxication by phosphorus. The cockerel having in all probability partaken of food prepared to destroy rats. The symptoms were described as follows: comb of a good color, bleeding at several points as through ecchymotic spots of unbroken skin. At the anterior end of the comb there was a big scab formed by several small spots coalescing. The skin was dark under the wings, the bird was weak and had diarrhea. He died the same day he was taken ill. Post mortem :muscles of the breast quite dark, also the skin. Intestines inflamed, liver fatty. On opening the gizzard some steam or fumes escaped having a strong odor like that of a box of wet matches. Phosphorus poisoning was the evident cause of death.

LIAUTARD.

CAUSE OF WORM NODULES (ONCHOCERCA GIBSONI) IN CATTLE. J. F. McEachran and G. F. Hill. *Bulletin, Commonwealth of Australia.*—Worm Nodules are very prevalent in cattle in the Northern Territory, Australia. Buffalo seem to be exempt. The mode of infection is undetermined. Five calves were imported from Victoria where worm nodules are rarely seen. One calf was placed in the field with local cattle. It contracted the nodules in six months. Two of the calves were placed in an unscreened pen with a cement floor. Two were placed in a screened pen with the same kind of floor, where they were protected from flying and biting insects. The animals in the unscreened pen were not infected in seven to eight months exposure to insects privileged to come from cattle near at hand, which were infected. The animals in the screened pen were not infected. Biting and flying insects are eliminated as intermediary hosts by these experiments. So are skin parasites that are able to travel a short distance from one host to another. The experiments suggest that the intermediary host of *O. gibsoni* is on the ground.

HAYDEN.

INTUSSUSCEPTION OF SMALL COLON IN THE HORSE. P. G. Bond. The case occurred in a six year old mare which had never been ailing. She showed all the symptoms of colicky trouble which suggested an unfavorable prognosis with a diagnosis of torsion of the intestines. The condition of the mare remained, notwithstanding

treatment, about the same, when she rapidly grew worse one morning and died. At the post mortem, there was found a distance of eight feet of the small colon invaginated. It required strong traction to withdraw it. The whole lumen of the canal was occluded; the intestines dark and almost black in color. The lesion was on the near side and the portion of the intestine invaginated was twisted. LIAUTARD.

CYST OF THE EPIGLOTTIS IN A HORSE. Major F. Hobday, F.R.C.V.S., A.V.C. *Veterinary Journal.* A rare case which occurred in a cart horse, with the history that he would suddenly stop, stare around wildly and throw up his head; showed difficulty in swallowing and dyspnea; fell down in a semi-comatose state, lying down for a few moments, then rise apparently all right. This condition took place independently of feeding time and generally upon walking out.

On exploration of the back of the pharynx, a cyst about as big as a Tangerine orange was found attached by a peduncle. It was removed with the ecraseur and the removal was followed by immediate and perfect cure. LIAUTARD.

INTERDIGITAL MELANOTIC TUMOR. Henry Taylor, F.R.C.V.S. *Veterinary Record.*—A spaniel three or four years of age had interdigital abscesses. One, lately formed, was between the toes of the forefeet, causing slight pain, yet the dog was not lame, though an abscess was certainly forming. It looked as if some foreign body was present. Cocaine was injected and a free incision made. Instead of a foreign body, there was found a lobulated little tumor as black as India ink. Some of it was scraped away but it was very adherent to the surrounding structures and partook of the nature of a fibromatous tumor having many ramifications. The tumor was not removed as the owner objected. LIAUTARD.

ABDOMINAL TUBERCULOSIS. E. Wallis Hoare, F.R.C.V.S. *Veterinary News.*—A seven year old cow due to calve in three months had been comparatively healthy but stood in poor condition. She was dull and had a delicate appetite. When called, the author found her with sunken eyes, no appetite, no rumination. Notwithstanding treatment she got worse. She had her calf in due time and finally died. All the abdominal organs were found

glued together. There was tuberculosis all over. Enormous abscess in the liver. Lymph glands of the mesentery all hypertrophied and showed caseous alterations. There were no lesions in the thoracic cavity. LIAUTARD.

INVAGINATION OF SMALL INTESTINE—NECROSED PORTION 15 FEET LONG EXCRETED. John Jones. *Veterinary News.* Record of a Shorthorn bullock which had a very severe spell of colic, for which the author was called. Upon arrival he found him free from unpleasant symptoms but noticed behind him a considerable quantity of thin, watery fecal matter containing a mass of necrosed small intestine measuring fifteen feet in length, with the mucous membrane on the outside. The animal was well, ate well and fatted rapidly. LIAUTARD.

COCAINE IN RETENTION OF URINE. M. Rousseau. *Bull. de la Soc. Centr.*—An aged horse was found in his stall straining, his face was anxious and he showed dull colicky pains. The bladder was full and distended. The catheter was not used but one grain of morphine injected subcutaneously. No relief was obtained. Two hours after, an injection of 20 centigrams of cocaine was made and was followed shortly afterward by an abundant micturition and a perfect recovery. LIAUTARD.

—It is reported that the retirement of a number of American veterinarians from the Philippines has caused serious inconvenience. Rinderpest, which for years has been the dread cattle scourge of the islands, reached a high mark of fatality last year. The veterinary force, already reduced in numbers, was further crippled by the small appropriation for their work.

—Dr. Chester L. Roadhouse, associate professor of veterinary science at the University of California, Berkeley, has been appointed professor of dairy industry with six months' leave of absence for travel and study. On his return to California Dr. Roadhouse will reside at the University Farm, Davis, Cal., and will become head of the division of dairy industry of the University of California.

ASSOCIATION MEETINGS

AMERICAN VETERINARY MEDICAL ASSOCIATION

REPORT OF THE COMMITTEE ON DISEASES

THE EFFICIENCY OF DISINFECTANTS

C. H. Higgins
(From the Health of Animals, Biological Laboratory)
Ottawa, Canada.

The determination of the efficiency of a disinfectant is an art acquired only by close application and much practice in the carrying out of the details. To read the description of any one of the many methods used would seem to indicate that there is little of an intricate nature to master. After making a few tests one is impressed with the necessity for practice and even after an extended experience artifacts appear of an inexplicable nature.

Our experiments with the disinfecting problem extend over the past seven or eight years but it has only been within the last two years when at the request of the Veterinary Director General more extensive detailed work has been undertaken. His permission was secured for the presentation of this paper as an interim report of our investigations as my contribution to the report of the Committee on Diseases.

As the basis of our work we have used the method described by the Hygienic Laboratory in Bulletin No. 82. Although we have used the Rideal-Walker*[1], the London Lancet Commission*[2], and other methods, we find that the Hygienic Laboratory method gives us the most satisfactory results. In this method, however, we have used the device recommended by the London Lancet Commission for the sterilization of our platinum loops. We use the platinum loops in preference to the platinum spoons, of the Lancet Commission, as they are more easy of manipulation and repeated experiments indicate the results to be equally trustworthy. As a culture medium, we have used that recommended by Wright although latterly we have not been able to secure Witte's peptone for all of our work. We have, however, checked our results sufficiently to

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*1. S. Rideal and J. T. A. Walker; *Journ. Roy. San. Inst.*, London, 1903, page 424.

*2. The Standardization of Disinfectants, London Lancet Commission, *The Lancet*, Vol. 177, Nos. 4498, Nov. 13th, 1909, page 1454; 4499, Nov. 20th, 1909, page 1516; 4500, Nov. 27th, 1909, page 1612.

indicate that the peptone which we have been using gives practically identical and equally constant results.

In dealing with the efficiency of disinfectants we have of course followed many details of a minor nature which cannot properly be inflicted upon this meeting. These details are of interest only to the laboratory workers confronted with the actual problems encountered during their testing. It is our purpose to present the data which we have secured and the recommendations which we may see fit to make in a special bulletin at the earliest opportunity, and the information given herein is for the guidance of those who are confronted with actual disinfecting problems and will not enumerate the purely technical features of our investigations.

That there are many disinfectants on the market each possessing advantages over the others needs no explanation on my part owing to the fact that the persons interested in their sale are very careful to extol the virtues of the particular product which they may be representing at the time. Unfortunately, however, for the practitioner and the person who is charged with the sanitary control of contagious diseases, we have found that the representations made are not always in accord with the facts. Some firms, however, are very careful in this regard and when a particular preparation has been shown to be below the standard which they have intimated, they will do their utmost to protect the name which they desire their product to maintain.

We have examined a great many samples of Liquor Cresolis Compositus, U. S. P. and these we find to be fairly constant in their germicidal efficiency. There seems, however, to be some difference of opinion regarding the preparation of this material, some experts* holding that the linseed oil content should be reduced or that it should be substituted by soft soap or cotton seed oil; others hold that heat should be applied before the addition of the cresol, and there are various other minor suggestions. We are not in a position to make a recommendation in this regard, believing that the final results, namely, the phenol or germicidal coefficient is the one which should govern the suitability of the product for any general disinfecting operation.

We have tested many disinfectants as to their suitability for use in general disinfecting operations and find their efficiency to

*See page 332 Hygienic Laboratory Bulletin No. 105.

vary from nothing to eighteen, when judged by the Hygienic Laboratory method. To determine in every instance the efficiency of a disinfectant from its appearance, the watery solution, or its odor, we have found to be an impossibility. Nothing but an actual test will determine its relative value. We have found that the creolin or black coal tar products vary in their germicidal efficiency, few, however, give us a coefficient value higher than seven. We have found that ordinary lime, fresh burned, from various localities in Canada give us, when tested immediately after making the solution, a phenol coefficient of from nine to nineteen. When this solution is permitted to stand for any length of time the phenol coefficient drops at least one-half. The fresh solution when tested with organic matter will only give us a phenol coefficient of about one-third of that secured without organic matter. Why we have such a drop in a limewash solution after standing, even though tightly corked, we are unable at this moment to explain. Further experiments will doubtless give us the details in this connection.

The phenol coefficient is based upon the germicidal efficiency of pure crystals of carbolic acid or phenol and their power to destroy a given organism. In accordance with the Hygienic Laboratory Method, we have used the Hopkins strain of typhoid culture. Thus, when we express the coefficient value of a disinfectant to be a given number, this should be interpreted to mean that the given number or coefficient is the relative lethal effect of that particular disinfectant compared with pure carbolic acid or phenol on the typhoid organism. Therefore, if we express the phenol coefficient as 2.0 this would mean, that if you are accustomed to using your phenol or carbolic acid in a 5% solution, you would secure under ordinary conditions equivalent results with a two and one-half per cent solution of this stronger product. For the purpose of arriving at the dilution in which the disinfectant should be used we are arbitrarily specifying the following: a disinfectant should be made using therefor 40 lbs. of freshly burned stone lime to the barrel of water as a base and to this add sufficient disinfectant having a phenol coefficient of not less than 2.0 to make a 3% solution of the disinfectant in the limewash preparation. Where the phenol coefficient is shown to be in excess of 2.0, the amount of disinfectant to be added may be reduced proportionately. Thus if a disinfectant having a phenol coefficient of 10.0 is used, a limewash solution containing 0.6% of the disinfectant will be the equivalent.

In our routine work we have found that there is a considerable variation in the strength of some of the disinfectants after standing various periods of time. We were unable at the outset to understand why our coefficient values were so variable but a few experiments showed us that a deterioration in value resulted from an exposure to light. This dropping in coefficient value has with one particular sample been three full coefficient points. In this connection we were at a loss to understand why various manufacturers used amber glass rather than flint glass bottles as containers but the reason therefor is now apparent. Their experiments had undoubtedly indicated this deterioration to them and naturally they took such means as were available to overcome its effects. In some instances not only is an amber glass bottle used but also a label that covers almost the entire outside area. Various tests indicated that the disinfectants having the higher coefficients are the ones which show the greatest loss in coefficient value on exposure to light.

I present hereunder data giving the details of tests made at intervals on two samples of disinfectants:

Disinfectant A. A proprietary disinfectant with a guaranteed phenol coefficient of 15.0 according to the Hygienic Laboratory method. (Laboratory No. 7612). This disinfectant was received in an eight ounce original amber glass container. The label covered the four sides of the container.

Test 1 made shortly after receipt.

December 21-23, 1915. Temp. 20°C.

Minutes Exposure			2½	5	7½	10	12½	15	
Phenol	1–80	4+12							
	1–90	4+14	—	—	—	—	—	—	
	1–100	4+16	+	—	—	—	—	—	$\frac{\frac{1400}{90} + \frac{1700}{110}}{2} =$
	1–110	4+18	+	—	—	—	—	—	
	1–120	4+20	+	+	+	+	+	+	
	1–130	4+22	+	+	+	+	+	+	
1% Sol.	1–1100	2+20	—	—	—	—	—	—	
	1–1200	2+22	—	—	—	—	—	—	$\frac{15.5 + 16.2}{2} =$
	1–1300	2+24	—	—	—	—	—	—	
	1–1400	1+13	—	—	—	—	—	—	15.8
	1–1500	1+14	+	+	—	—	—	—	
	1–1600	1+15	+	+	+	—	—	—	
	1–1700	1+16	+	+	+	+	+	+	

Test 2. Made after disinfectant was allowed to stand in a clear glass burette exposed to diffuse daylight for twelve days.

August 5-7, 1916. Temp. 20°C.

Minutes Exposure			2½	5	7½	10	12½	15	
Phenol	1–80	4+12	—	—	—	—	—	—	
	1–90	4+14	+	—	—	—	—	—	$\frac{\frac{1100}{80} + \frac{1400}{100}}{2} =$
	1–100	4+16	+	+	—	—	—	—	
	1–110	4+18	+	+	+	+	+	+	
	1–120	4+20	+	+	+	+	+	+	
1% Sol.	1–1100	2+20	—	—	—	—	—	—	
	1–1200	2+22	+	—	—	—	—	—	$\frac{13.75 + 14}{2} =$
	1–1300	2+24	+	+	—	—	—	—	
	1–1400	1+13	+	+	+	+	—	—	
	1–1500	1+14	+	+	+	+	+	+	13.87
	1–1600	1+15	+	+	+	+	+	+	

Tests made of the material taken direct from the original container have shown no appreciable variation during the past eight months.

Disinfectant B. A proprietary disinfectant received in a pint container having a guaranteed phenol coefficient of 16.0, according to the Hygienic Laboratory method (Laboratory No. 7791). The container in this case was of amber glass with a label covering the entire bottle.

Test 1. Made shortly after receipt of sample.

May 25-27, 1916. Temp. 20°C.

Minutes Exposure			2½	5	7½	10	12½	15	
Phenol	1–80	4+12							
	1–90	4+14	—	—	—	—	—	—	$\frac{\frac{1500}{90} + \frac{2500}{120}}{2} =$
	1–100	4+16	+	—	—	—	—	—	
	1–110	4+18	+	+	—	—	—	—	
	1–120	4+20	+	+	+	+	—	—	
	1–130	4+22	+	+	+	+	+	+	
1% Sol.	1–1500	1+14	—	—	—	—	—	—	
	1–1600	1+15	+	—	—	—	—	—	$\frac{16.6 + 20.8}{2} =$
	1–1800	1+17	+	+	—	—	—	—	
	1–2000	1+19	+	+	—	—	—	—	
	1–2250	1+21.5	+	+	+	—	—	—	18.7
	1–2500	1+24	+	+	+	+	+	—	
	1–2750	1+26.5	+	+	+	+	+	+	

Test 2. Made after permitting the disinfectant to stand in a clear glass burette exposed to diffuse daylight for one week.

July 22-24, 1916. Temp. 20°C.

Minutes Exposure			2½	5	7½	10	12½	15	
Phenol	1–80	4+12	+	—	—	—	—	—	$\dfrac{\frac{1100}{70} + \frac{1400}{100}}{2} =$
	1–90	4+14	+	—	—	—	—	—	
	1–100	4+16	+	+	+	—	—	—	
	1–110	4+18	+	+	+	+	+	+	
	1–120	4+20	+	+	+	+	+	+	
1% Sol.	1–1000	2+18	—	—	—	—	—	—	$\dfrac{15.7 + 14.00}{2} =$
	1–1100	2+20	+	—	—	—	—	—	
	1–1200	2+22	+	+	—	—	—	—	
	1–1300	2+24	+	+	—	—	—	—	14.8
	1–1400	1+13	+	+	+	+	+	—	
	1–1500	1+14	+	+	+	+	+	+	

Test 3. Made after permitting the disinfectant to stand in a clear glass burette exposed to diffuse daylight for twenty-one days.

August 5-7, 1916. Temp. 20°C.

Minutes Exposure			2½	5	7½	10	12½	15	
Phenol	1–80	4+12	—	—	—	—	—	—	$\dfrac{\frac{1000}{80} + \frac{1400}{100}}{2} =$
	1–90	4+14	+	—	—	—	—	—	
	1–100	4+16	+	+	—	—	—	—	
	1–110	4+18	+	+	+	+	+	+	
	1–120	4+20	+	+	+	+	+	+	
1% Sol.	1–1000	2+18	—	—	—	—	—	—	$\dfrac{13.7 + 14.0}{2} =$
	1–1100	2+20	+	—	—	—	—	—	
	1–1200	2+22	+	—	—	—	—	—	
	1–1300	2+24	+	—	—	—	—	—	
	1–1400	1+13	+	+	—	—	—	—	13.8
	1–1500	1+14	+	+	+	+	+	+	
	1–1600	1+15	+	+	+	+	+	+	

It is thus observed that as far as the two samples are concerned the exposure to diffuse daylight has exerted a marked deterioration which must be borne in mind when supervising disinfecting operations.

During the progress of the work we were struck by a variation that occurred in the coefficient secured from a certain proprietary disinfectant. With our curiosity aroused we undertook steps to determine this factor with the result that we found it to be due to sedimentation. The sample in question was labelled "Cresol Compound". After thoroughly shaking the sample a burette seventy-five milimeters long was filled and 25 days thereafter 5 cubic centimeters were taken from the top portion and 5 cubic centi-

meters from the bottom with the result that there was a difference of 0.5 in the coefficient secured, that from the bottom being the stronger.

Realizing that it is essential to know the relationship which our present coefficient, namely that of the Hygienic Laboratory method, bears to actual disinfecting operations we undertook the determination of the phenol coefficient when anthrax spores were used for the test culture. In this work we used a standard medium composed of five grams of Liebig's beef to the litre of water. This medium did not contain peptone or other additional ingredients and has for years proven a most satisfactory medium upon which to grow the anthrax organism. The anthrax organism it may be stated grows very sparingly upon the standard medium of typhoid.

We used the anthrax organism for the reason that anthrax is a disease affecting an animal and its organisms usually show a constant virulence. We present hereunder details connected with our experiments where this organism was used, the disinfectant being the same as that referred to above in connection with the deterioration due to the influence of light.

Anthrax Test A. Disinfectant used laboratory samples 7791. Phenol coefficient 8.7. Culture used: Anthrax spores.

August 9-11, 1916. Temp. 20°C.

Phenol Saturated Sol. in Water, 8.25%	45 Minutes	2 hrs.	3 hrs.	4 hrs.	5 hrs.	22 hrs.	30 hrs.
5 c.c.	+	+	+	+	+	+	+
4½ c.c. + H_2O ½ c.c.	+	+	+	+	+	+	+
4 c.c. + H_2O 1 c.c.	+	+	+	+	+	+	+
3½ c.c. + H_2O 1½ c.c.	+	+	+	+	+	+	+
3 c.c. + H_2O 2 c.c.	+	+	+	+	+	+	+
100% Solution	+	+	+	+	+	+	+
75% Solution	+	—	+	+	—	+	+
50% Solution	+	+	+	+	+	+	0
25% Solution	+	+	—	+	—	—	0
20% Solution	—	+	—	+	—	+	—
15% Solution	+	—	—	—	—	—	—
10% Solution	—	+	+	—	—	—	—
8% Solution	—	—	—	+	+	—	—
6% Solution	+	+	+	+	+	—	—

Anthrax Test B. Disinfectant used Laboratory sample 7791.

August 10, 1916. Temp. 20°C.

		2½ min.	5 min.	7½ min.	10 min.	12½ min.	15 min.	60 min.
1–10	4+0	—	—	—	—	—	—	—
1–15	4+2	+	+	—	—	—	—	—
1–20	4+4	+	+	+	+	+	—	+
1–25	4+6	+	—	+	+	+	+	
1–30	4+8	+	+	—	+	+	+	+
1–35	4+10	+	+	+	+	+	+	+
1–40	4+12	+	+	+	+	+	+	+
1–45	4+14	+	+	+	+	+	+	
1–50	4+16	+	+	+	+	+	+	+

Observation made at end of 24 hours. All showed growth at end of 48 hours.

Anthrax Test C. Disinfectant used Laboratory sample 7791.

August 11-12, 1916. Temp. 45°C. Each dilution (except last) in triplicate.

		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	45 min.	60 min.	17 hrs.	20 hrs.	44 hrs.
1–10	4+0	—	—	—	—	—	—	+	—	—	—	—
1–10	4+0	—	—	—	—	—	—	+	—	—	—	—
1–10	4+0	—	—	—	—	—	—	+	—	—	—	—
1–15	4+2	—	—	—	—	—	—	+	—	+	+	—
1–15	4+2	+	—	—	—	—	—	+	+	+	+	—
1–15	4+2	+	—	—	—	+	—	+	+	—	+	—
1–20	4+4	+	+	+	—	+	+	+	+	+	+	—
1–20	4+4	+	+	+	+	+	+	+	+	+	+	—
1–20	4+4	+	—	+	+	+	—	+	+	+	+	—
1–25	4+6	+	+	+	+	+	+	+	+	+	+	—

After incubating for 48 hours these cultures showed positive growths indicating that all the spores had not been killed.

From this data it is evident that even the disinfectants giving us the highest coefficient readings prove practically inert when used on anthrax spores. That there is a germicidal effect is shown by the fact that growths could not be discerned at the end of 24 hours in solutions containing from 8 to 15% of this particular disinfectant, whereas higher or lower dilutions presented growths at the end of that period. This indicates that the disinfectant in question is undoubtedly more active against anthrax when used in a proper dilution.

This work emphasizes the well known difficulty experienced in connection with the disinfection of hides, wool, etc., against anthrax.

We are continuing this particular phase of the work and hope to present further data.

No mention has been made in the foregoing regarding the use of organic matter in our tests. We have used the peptone-gelatin solution as a routine procedure with the result that a marked drop in the efficiency as expressed by the coefficient value is to be observed. Ordinarily the coefficient is reduced approximately one-half. With lime, however, we have found it to be reduced by two-thirds, thus, a fresh lime solution that gives a phenol coefficient of 17.0 gave us a coefficient of 5.8 with organic matter.

Our work has had as its object not only a determination of the coefficient value but rather a determination of the efficiency of various disinfecting materials under field conditions. It is my opinion that disinfectants should be bought on their standard of efficiency. At present we are forced to use a more or less arbitrary system of determining this but it is to be hoped that with further experience a more accurate method of determination will be the result.

In closing I desire to acknowledge the hearty interest and co-operation of Dr. Torrance, Veterinary Director General for Canada, and Mr. F. W. Almond, who has been closely associated with the actual manipulative details.

GENERAL DISCUSSION ON THE REPORT OF THE COMMITTEE ON DISEASES.

Dr. O. H. Eliason: I would like to tell you of some of the conditions which confront us in the State of Wisconsin. I am now speaking of two spontaneous outbreaks. One was in a herd of cattle. The symptoms were a very high temperature; the animal might look as if it was apparently well and go around grazing and walk the distance of this room, and fall dead. The conclusions drawn by the practitioners were those of anthrax. On examination under a microscope there were revealed some bodies which looked very much like those of anthrax. From personal examination I found one animal which exhibited a very high temperature, but, as the animal did not show any indications of dying immediately we decided to draw some of the blood from the jugular vein. Two samples were taken, and drawn into sterile bottles and each of these were submitted to two different laboratories. The first laboratory reported that they found bodies which resembled those of anthrax. We immediately got ready for the vaccination of the balance of the herd. During the time it took to get the vaccine, the other laboratory followed up the examination a little further,

Their first examination was also that of bodies like those of anthrax, but to make a long story short, the examination by animal inoculation showed conclusively that the disease was hemorrhagic septicemia. The herd was placed in the barn about the time these samples were taken, and after this animal died no further casualties occurred.

Just before coming away—the procedure is not quite finished—we have not examined bacteriologically all of the specimens, but this is a spontaneous outbreak in a herd of hogs.

I wish to present some of the different symptoms between these hogs and that of the ordinary hog cholera. One of the symptoms is that a hog will lie quietly, but if one of the animals comes up to him and disturbs him he is liable to get up and give him a whack with his tusks. There is no indication of any soreness in the feet.

Another symptom was that one of the hogs, one day, was totally blind. The next day he was apparently well and was running around. From the last report he was still living.

We have made examinations of at least eight hogs out of this herd; all of the symptoms enumerated here have been found. There is no history which will show where this disease originated. The disease was not known to exist there before.

DR. CAHILL: I would like to ask the doctor to give some of the lesions which he found in the hogs.

DR. ELIASON: The lesions were those of pneumonia; hemorrhagic areas underneath the skin, also in the kidneys; in one kidney there was found some pus in the hilum; the intestines were also hemorrhagic; hemorrhagic areas in the pelvis; there was also found a sore in one of the hogs' stomach. That, however, might not have had any connection with this disease. The lungs were very typical of what has been described this afternoon.

DR. CAHILL: Was there any blood filtered and drawn from these hogs?

DR. ELIASON: The experiment has not been completed yet.

DR. HARDENBERGH: I was particularly interested in this talk on hemorrhagic septicemia by Dr. Mohler and Dr. Kinsley, because of the fact that the only mention made of infection of equines was that made by Dr. Mohler of a colt which was exposed to some sheep.

I would like to bring to the attention of the meeting at this time the fact that last week we had an outbreak in a farm in Lancaster County among six mules. Three of them died before the matter was brought to the attention of the state authorities. The last one was reported by one of our state field agents; specimens were submitted to the laboratory for elaborate diagnosis. On Friday of last week another animal, which had been sick about ten hours, was reported and a man was sent to the farm to investigate this case. The animal was dead that afternoon, having died in-

side of 24 hours from the time it first showed any medical symptoms. A careful autopsy of both of these cases, one on Thursday, the other on Friday, showed typical post mortem lesions of hemorrhagic septicemia; with exhibitions of subserous hemorrhages. Specimens were carefully collected from the last case and brought to the laboratory and showed evidence in the spleen and heart blood. From these subserous hemorrhages pure cultures were obtained of what microscopically are identical with the *Bacillus bovisepticus.*

Diagnostically inoculations are being carried out to further these diagnoses. This, to my knowledge, is the only outbreak of hemorrhagic septicemia that we have had in equines in Pennsylvania in the last five or six years.

DR. KINSLEY: I was interested in Dr. Hardenbergh's report. The title of my paper practically eliminated any discussion of the common diseases in horses. About one year ago I examined specimens from an outbreak in mules from Virginia. I found the organism identically as the doctor says, that of the bacillus equine septicus.

More recently we have been able to isolate a similar organism from like conditions in some of our stables in Kansas City, and I presume the condition can be well called hemorrhagic septicemia of equines.

DR. DEVINE: What are the symptoms, doctor?

DR. KINSLEY: The symptoms, as we have observed them, are perhaps similar to what we ordinarily call human influenza, getting dopy, high temperature, rapid pulse, and the usual evidences of congestion of the lungs. The animals in this instance, and in those mentioned usually die in 12 to 24 hours after the first apparent symptom.

DR. DEVINE: Are there any subcutaneous lesions?

DR. KINSLEY: No subcutaneous lesions, excepting slight blocking of the lungs, edema of the legs.

DR. C. P. FITCH: The relationships or the relationship which exists among the group of organisms which cause this disease or this group of diseases which are now being discussed seems to me one of the most important questions. I wish to inject into this discussion a little work which was done in Ithaca at the New York State Veterinary College on this problem. This work was carried out upon the organisms of fowl cholera, *Bact. avisepticus*, of bovine hemorrhagic septicemia, *Bact. bovisepticus*, the organism which caused that old disease known as swine plague or *Bact. suisepticus,* organisms obtained from Norway, Reindeer pasteurella and Kalber pasteurella. It was found that in a careful series of laboratory cultures made particularly in relationship to the action of these organisms on the sugars and alcohols, that there was a great simi-

larity in this group of organisms, that this similarity was even more marked than it is in the colon typhoid groups or other allied groups of microorganisms.

Dr. Cahill: I would like to ask Dr. Kinsley or Dr. Mohler whether or not they have had enough experience to go on record with these diseases in swine, and also whether that same experience was on immune hogs or non-immune hogs.

Dr. Mohler: I could not hear your question.

Dr. Cahill: I asked regarding the value of bacterins for hemorrhagic septicemia or swine plague in swine, and also whether or not your experience was with swine immune to hog cholera or in non-immunes.

Dr. Mohler: We were unable to determine whether the hogs referred to were immune to hog cholera or not. However, they had not received any hog cholera vaccination.

Dr. Cahill: I don't believe I have made myself clear. Have you seen an outbreak of hemorrhagic septicemia in any swine which you knew to be immune to hog cholera?

Dr. Mohler: I don't know whether they were immune to hog cholera or not. That question was not up in the particular herd that I spoke about where the hogs were in with the cattle and contracted hemorrhagic septicemia, I presume from the diseased cattle. Whether they were immune to hog cholera or not, was not ascertained. I might say that several years ago Theobald Smith stated that he had studied three independent outbreaks of hemorrhagic septicemia in hogs in Massachusetts. Theiler also reports that he was able to isolate organisms of this disease without finding any virus of hog cholera, in at least one outbreak. These were pure cases of hemorrhagic septicemia or so-called swine plague, but whether the hogs were immune to hog cholera or not, I am unable to say.

Dr. Cahill: Regarding the use of bacterins on swine?

Dr. Mohler: The bureau has not used bacterins of this kind on hemorrhagic septicemia in swine, but there is no reason why the vaccination for hemorrhagic septicemia which has long been advocated, would not work just as well on hogs as on horses, sheep or cattle. However, this disease in hogs is very rare and the opportunity for observing the effects of bacterins is therefore equally infrequent.

PROPOSED CONSTITUTION FOR THE A. V. M. A.

D. M. Campbell, Chicago, Ill.

[Although Dr. Campbell's amendment was received, in printed form, by many members at the Detroit meeting, it should, like other amendments, be brought to the attention of all the members as a part of the proceedings. It was inadvertently omitted from the December Proceedings, as in the stenographer's notes it was read by title only.]

Article I. Name

This organization shall be incorporated and known as the American Veterinary Medical Association.

Article II. Objects

The objects of this Association are: To promote good fellowship; to elevate the standard of veterinary education; to enlighten and direct public opinion regarding veterinary problems of state medicine; to procure the enactment and enforcement of uniform laws and regulations for the control of animal diseases; to protect and promote the professional interests of the veterinary profession.

Article III. Membership

Section 1. This Association shall consist of sustaining, associate and honorary members.

Sec. 2. Sustaining members shall consist of those now active members of the Association and others who may be elected to sustaining membership in compliance with the provisions of this constitution. No sustaining members shall be exempt from the payment of dues.

Sec. 3. Associate members shall comprise those ineligible to sustaining membership who may be elected to membership in one or more sections of the Association. Associate members shall be exempt from the payment of dues and shall have no voice in the proceedings of the Association. In the election of section chairman and other matters pertaining exclusively to sections they shall have all the rights and privileges of sustaining members in the section or sections to which they belong, and shall be liable for special dues levied by those sections, or by the Board of Trustees upon those particular sections, and at the discretion of the Board of Trustees they shall pay a reasonable price for the publications of the Association. No associate or sustaining member shall be a member of more than two sections at the same time.

Sec. 4. Persons who have rendered valuable service to veterinary science or allied sciences may be elected to honorary membership in this Association at any annual session provided that not more than three honorary members shall be elected in any one year, and that no one shall be elected to honorary membership except upon the recommendation of the Board of Trustees. Honorary members shall have all the privileges of sustaining members except that they shall have no vote in the Association and shall be ineligible to elective offices in the Association. They shall be exempt from the payment of dues.

Article IV. Dues

The annual dues in this Association shall be five dollars, payable in advance for the calendar year, to the Secretary. Members in arrears in the pay-

ment of dues more than two years shall be dropped from membership after due notice that their delinquency will so result.

ARTICLE V. APPLICATION FOR MEMBERSHIP

Section 1. No applicant shall be eligible to sustaining membership who has not been graduated from a veterinary college maintaining entrance requirements and a course of instruction approved by a permanent committee on intelligence and education appointed by the Board of Trustees and of which one of their number shall be chairman, or by a veterinary college not now in existence, whose graduates, in the opinion of the Board of Trustees, are properly qualified for membership.

Sec. 3. Applications for sustaining membership in this Association shall be made in the applicant's own handwriting on blanks provided by the Association and shall give all the information asked for on the blank. They shall be endorsed by two active members resident in the applicant's state, province or territory, or by the Board of Trustees, and shall be filed with the Secretary in compliance with such conditions as the Board of Trustees shall formulate.

The Board of Trustees may at their discretion recognize as constituent associations regularly organized veterinary associations in any state or province and require that applicants for membership in this Association shall be properly vouched for as members of constituent associations in their respective states or provinces.

ARTICLE VI. OFFICERS

The officers of this Association shall be: a President, Vice-President, Secretary, Treasurer, five Trustees, and a Chairman of each of the sections into which the Association may be divided as provided for elsewhere.

ARTICLE VII. QUALIFICATIONS OF OFFICERS

Section 1. No one shall be eligible for nomination or election to the office of President of this Association who has not been a sustaining member, in good standing, for a period of at least ten years immediately preceding the date of such proposed nomination and election. No one shall be eligible to re-election to the office of President.

Sec. 2. The qualifications for the office of Vice-President shall be the same as for President, except that Vice-Presidents shall be eligible to re-election.

Sec. 3. All other officers of this Association shall be sustaining members, in good standing at the time of their nomination and election, except that associate members shall be eligible for the offices of chairman of the sections to which they belong.

Sec. 4. Trustees must be residents of the district from which they are nominated and elected and a change of residence of any Trustee to any place outside the limits of the Trustee District in which he was nominated and elected shall vacate the office.

ARTICLE VIII. DUTIES OF OFFICERS

Section 1. It shall be the duty of the President to deliver an address at the opening of the annual meeting over which he is to preside, and to transmit this address and from time to time such other messages as he may deem necessary, to the Board of Trustees, for their consideration; to preside at general

and special meetings of the Association; appoint committees and officers whose selections are not otherwise provided for and perform such other duties, not in contravention with this constitution or by-laws of the Association, as ordinarily devolve upon the chief executive officer of similar bodies.

Sec. 2. In case of death or resignation of the President, or in case of his inability to perform the duties of his office from any cause, the same shall devolve upon the Vice-President for the remainder of the unexpired term, or until the disability be removed.

Sec. 3. In case of gross misrepresentation of this Association by any Trustee, the President of the Association may remove the offending official from office, in which case he shall immediately call an election to fill the vacancy for the unexpired term, and the Trustees so removed shall automatically become a candidate for re-election. Such special election shall be held in accordance with the rules for general elections, except that the Secretary, in carrying out the provisions of the sections on nominations and elections, shall act under the direction of the President of the Association and shall deliver the sealed ballots to a special canvassing board appointed by the President.

Sec. 4. The Secretary shall devote his whole time to the work of the Association, except as hereinafter provided. He shall maintain an office at the headquarters of the Association, which shall be kept open during ordinary business hours, and in which shall be kept the library, except as hereinafter provided, and other property of the Association. He shall be custodian of all property of the Association, except moneys, for which he shall give a bond satisfactory to the Board of Trustees. He shall turn over to the Treasurer quarterly all moneys of the Association coming into his possession. He shall keep a record of the proceedings of all general and section meetings, and shall edit and issue all publications, except as hereinafter provided; prepare the program for all meetings and perform such other duties as he may be directed to perform by the Board of Trustees. He shall perform the foregoing and all other duties of the office under the immediate direction of the Board of Trustees, except in matters affecting the personnel of the board, when he shall act under the direction of the President.

Sec. 5. The Secretary shall be elected in the manner hereinafter provided, for a term of five years, and shall receive for his services a salary to be determined by the Board of Trustees, not in excess of $2,500 per year.

Sec. 6. The Treasurer shall account to the Association for all of its moneys coming into his hands. He shall give bond to the Association in the sum of Five Thousand Dollars with sureties to be approved by the Board of Trustees conditioned for the faithful performance by him of the duties of his office. At the expiration of his term of office he shall account for and turn over to his successor in office all moneys belonging to the Association.

The Treasurer shall pay out moneys only on warrants of the Board of Trustees countersigned by the Secretary.

The Treasurer shall at the regular annual meeting present a written detailed statement of all receipts and expenditures.

Sec. 7. The Board of Trustees shall constitute the administrative body of the Association and shall have power to make rules and regulations necessary for carrying into effect the provisions of this constitution.

Sec. 8. The Board of Trustees shall establish a permanent headquarters for the Association in a city centrally located and easy of access.

Sec. 9. The Board of Trustees shall select the time and place for the annual meetings of the Association and make the necessary arrangements for holding such meetings; provided that all annual meetings shall be held between the first of August and the fifteenth of September, unless the Association shall by mail ballot authorize a different date.

Sec. 10. The Board of Trustees shall pass upon the eligibility of all applicants for membership, and no applicant shall be elected to membership except upon the favorable recommendation of the board.

Sec. 11. All resolutions presented at meetings of this Association and all matters affecting its policy shall, before they are finally acted upon by the Association, be referred to the Board of Trustees to be reported back promptly with their recommendations. In case of disagreement between the Board of Trustees and the members present at any annual or special meeting, the question at issue shall, within thirty days, be submitted by mail to the whole membership, for its decision, in which case the matter together with reasonable argument of the Board of Trustees and the argument of some one selected by the president from those opposed to the policy of the Trustees shall be mailed by the Secretary to each member, who may record his decision on a blank prepared for that purpose and returned sealed to the Secretary, who shall deliver them to a special canvassing board appointed by the President. The decision of the membership shall prevail.

Sec. 12. Three members of the Board of Trustees shall constitute a quorum to do business, and the decision of a majority shall prevail, except that in the case of misconduct of any officer of the Association an affirmative vote of four members of the Board of Trustees shall be necessary to remove such offending officer and fill the vacancy until the next general election, provided that the Board of Trustees shall have no power to remove from office either the President or Vice-President of the Association.

Sec. 13. On the written application of one hundred members of the Association, the Board of Trustees shall submit any question to a referendum of the whole membership in the same manner as is provided for the submission of a disagreement between the Board of Trustees and the members attending any annual session, and the decision of the membership shall prevail.

Sec. 14. The Board of Trustees may, in case of necessity, levy a special assessment to raise funds for the Association, and no money belonging to the Association shall be paid out for any purpose except upon appropriation by the Board of Trustees.

Sec. 15. The Board of Trustees shall appoint such special and standing committees as may be necessary to aid it in its work, and at least one member of all standing committees shall be a Trustee; but nothing in this section shall be construed to prohibit the President from appointing such Special Committees as may be deemed necessary by the Association in convention assembled, except that two or more committees shall not be appointed for the same purpose.

Sec. 16. The Board of Trustees shall hold a regular session at the time and place of the annual meeting of the Association, and the Secretary shall call

special meetings of the Board upon the written request of three Trustees. All special meetings of the Board shall be held at the headquarters of the Association, unless the Board, by a vote, selects a different place.

Sec. 17. The Board of Trustees shall require the Secretary to attend all meetings of the Board, to keep an accurate record of its proceedings and such proceedings shall be published and distributed promptly to members of the Association, except such parts as may, in the judgment of the Board, best be withheld from immediate publication, but no record of the disbursements of funds and the purpose for which such disbursements were made shall be withheld from prompt publication.

Sec. 18. The Board of Trustees shall act and report promptly upon all recommendations of the President of the Association as heretofore provided.

Sec. 19. The Board of Trustees shall in case of death, resignation, or removal of any officer of this Association fill the vacancy for the unexpired term, except for vacancies in its own membership which shall be filled by special election, called either by the President as hereinbefore provided or by the Board of Trustees where no other provision is made.

Sec. 20. The Board of Trustees shall select one of their number to be known as Resident Trustee who shall exercise the full powers of the Board when it is not in session, provided that his acts may be nullified by a majority vote of the Board of Trustees. Such vote may be taken at any regular or special meeting of the Board or by mail on the initiation of any member of the Board, such ballot to be held by the secretary in the usual manner.

Sec. 21. The Board of Trustees may, at their discretion, appoint an editor to relieve the secretary of such of his duties as the Board may decide to be necessary.

Sec. 22. The Board of Trustees shall perform such other duties as are specified elsewhere in this constitution, and shall have power to perform such other necessary duties as are not specifically given to other officers or reserved to the Association.

Sec. 23. The Chairman of each section shall perform the usual duties of the presiding officer and in addition, on the request of the Board of Trustees, shall assist the Secretary in formulating a program for their respective sections and in the publication of the report of their annual meetings.

Article IX. Nominations

No more than sixty nor less than forty days prior to the call for any election, the Secretary shall send to each member of the Association a blank ballot explaining for what purpose the election is to be held, and ask such members to indicate their first choice for each of the officers and mail promptly to the Secretary. Thirty days shall be allowed for the return of these ballots, and at the expiration of such time such ballots as have been received shall be turned over to the Board of Trustees, who shall canvass them by districts, selecting the candidate receiving the highest number of votes in each district as nominees, except in the case of Trustees, in which case the highest five in each district shall be selected as nominees.

Article X. Elections

Section 1. General elections for the selection of officers of the Association (except Section Chairmen who shall be elected at the annual meeting in

the manner herein provided and the Secretary who shall be elected once in five years) shall be held each year and at the same time elections shall be held in the Trustee District represented by the Trustee whose term expires with the adjournment of the next annual meeting.

Sec. 2. All officers of the Association shall be elected by ballot and all ballots for the election of officials of this Association, except the Section Chairmen, shall be by mail and shall be held as follows:

Sec. 3. The Board of Trustees shall, through the Secretary, send to the last-known address of each member of the Association a notice of the election and a blank ballot containing the names of those nominated as heretofore provided for the office or officers, and a space in which the voter may write the name of his choice for the office or officers, provided his choice is not among those regularly nominated.

Sec. 4. A biographical sketch of each nominee shall be transmitted with the blank ballots. Such sketch shall not exceed one hundred words in length and shall give the residence, vocation and age of the applicant and a brief enumeration of his previous service for the Association and for the veterinary profession. The biographical sketch of the nominees for secretary shall be prepared by the Board of Trustees or under their direction. The sketch of other nominees shall be prepared by the secretary.

Sec. 5. Thirty days shall elapse between the mailing of the blank ballots and notice of the election, and the closing of the ballot, which to be counted must be returned to the Secretary by the voters within that time.

Sec. 6. Upon the close of any ballot the Secretary shall turn over to the Board of Trustees the unopened ballots which shall be canvassed by the Board and the result of the election announced in such manner as they shall provide.

Sec. 7. Notices of all general elections together with the blank ballots and the biographical sketches of the nominee shall be mailed from the headquarters of the Association to each member not less than forty days nor more than ninety days prior to each annual meeting.

Sec. 8. Officials chosen in any general election shall assume the offices for which they have been chosen at the close of the next annual meeting of the Association and their tenure of office shall be until the close of the following annual meeting or until their successors are chosen, except the President and Vice-President, who shall assume their respective offices at the close of the succeeding annual meeting, and their tenure of office shall be until the close of the third annual meeting succeeding their election.

Sec. 9. The Section Chairmen shall be elected by ballot by their respective sections on the third day of each annual meeting at an hour and place to have been announced in general session on the second day of the meeting, and their tenure of office shall be for one year from the adjournment of the annual meeting at which they are chosen and until their successors are chosen.

Sec. 10. For the purpose of election of members of the Board of Trustees, the United States and its possessions, the Dominion of Canada, and other parts of the world in which members reside, and into which it seems desirable to extend the influences of the Association, shall be divided into five districts, containing approximately equal numbers of members of this Association. These districts shall be known by number, and each district shall be entitled

to one member of the Board of Trustees elected by the members resident therein.

Sec. 11. At the first election held under the provisions of this constitution a member of the Board of Trustees shall be chosen from each district. The Trustee from the first district to serve for a term of one year, the Trustee from the second district to serve for a term of two years, the Trustee from the third district to serve for a term of three years, the Trustee from the fourth district to serve for a term of four years and the Trustee from the fifth district to serve for a term of five years, and thereafter one Trustee shall be elected annually for a term of five years.

Article XI. Sections

To facilitate its work at annual meetings, the Association shall be divided into sections, whose scope, designation, plan of organization, powers and privileges shall be determined by the Board of Trustees in compliance with the provisions of this constitution.

Article XII. Amendments

Amendments to this constitution may be made by a majority vote of all members in each trustee district or by the vote of three-fourths of all the members of the Association, the vote to be by mail ballot.

Article XIII. Organization

After this constitution shall have been adopted, the President of the Association shall within six months appoint an Organizing Committee who, together with the Secretary, shall divide the territory into five districts, of approximately equal membership in the Association and, as nearly as may be in accordance with the provisions of this constitution, hold the first primary for the nomination of officers (including both a President and a President-elect and a Vice-President and Vice-President-elect), call the first election, canvass the votes and take such other steps as may be necessary to put this plan into operation, provided that the first Board of Trustees, when elected, may change the boundaries of any of the districts created by the Organizing Committee, and thereafter the boundaries of these districts shall be changed only by the Board of Trustees, and not oftener than once in ten years.

BY-LAWS

Sec. I. The valid Rules and Regulations of the Board of Trustees and the valid acts of the Association pertaining to manner of procedure shall constitute the Precedents of this Association and shall have the force and effect ordinarily possessed by by-laws.

Sec. II. By-Laws may be amended, suspended or revoked by an affirmative vote of three-fourths of the members present at any annual meeting, or by an affirmative vote of four Trustees.

SECRETARY'S OFFICE

1827 South Wabash Ave., Chicago, Ill.

"DON'T BE A SHIRKER"

Observations on the European war have shown mighty clearly that an effective national defense must be based largely upon properly organized industry.

Even though amazing events have come to us too fast to analyze, we must have learned at least that much from this stupendous conflict of modern civilized nations, and if the matter has never impressed you before, think of it now and then decide in your own mind where the strength of a nation actually lies.

Is it in the courage of its people? No. Because, no one of the civilized nations has a monopoly of heroism. All white men are brave. Timidity and cowardice are but attributes of rare individuals. Is it wealth? Hardly! Because, there has been no threatened bankruptcy from the astounding destructiveness and enormous expense of this war. Is it intellectual supremacy? No! Because no one of the nations engaged in this conflict is manifestly subordinate to the others in this regard. Is it physical prowess? Again, no! Because, brawn today does not count as it did in mediævial warfare. Then pray, what is it?

The answer is "organization". Not military organization alone, oh, no, for this is but a small part of the nation's strength. It is the potential power behind the army and navy after all that must decide the conflict, and this includes every enterprise concerned in the production, preservation, manufacture and distribution of the nation's resources. To help to push one's enterprise to its highest efficiency in wartime is therefore a much needed help—a solemn duty in fact—and a form of patriotism that is not likely to be overlooked when in summing up results the credit of victory is being given to those who deserve it. There is likely, however, to be little credit accorded to the down-and-out shirker. Such a man will be discredited and even loathed by his fellow man. It does not matter whether the shirking is from military or from industrial duties, the offense is the same. Not all of us can take a command or shoulder a musket, neither can we all enter into the military organization in a professional capacity; but every man with red blood can become an important cog in the machinery of national defense by joining the movements which promote the

strength and increase the efficiency of his particular calling, whatever that calling may be; and he who fails to display at least this helpful spirit toward his country may live to regret his unmindfulness—his failure to do his "bit".

PROGRAM

A conference to complete definitely the plans of the program of the Section on General Practice was held at this office with Dr. T. H. Ferguson, Chairman and Dr. J. H. Blattenberg, Secretary of that section, April 2nd. The program which is already more than half filled, covers especially selected subjects from especially selected contributors, promises to be a very interesting and intellectual entertainment for practitioners of the Middle West. It has been planned to have a clinic to include diseases of cows, horses and dogs, by the foremost teachers and practitioners of the country. There will be no miscellaneous operations performed; each one will be selected and assigned to a definite surgeon who will come prepared to effectively present the whole subject and the technique of the procedure. The accommodations for this feature at the Kansas City Veterinary College are so much better than the association has enjoyed for so many years that it was thought advisable to take advantage of the opportunity to hold a good surgical clinic. A large audience can be handled in this amphitheatre and everyone will have an unobstructed view of the proceedings.

TRANSPORTATION

Concessions in rates to the annual meeting not previously announced and which have come to this office during the past month are:—low excursion rates from all southwestern points by the Southwestern Passenger Association announced by J. E. Hanneman, Chairman, March 15th; and a sixty dollar round-trip rate from Pacific Coast points announced by the Transcontinental Passenger Association, E. L. Bevington, Chairman, April 3rd.

In a very friendly letter from the Eastern Canada Passenger Association, G. H. Webster, Secretary, concessions are refused with much regret, on the ground that the district covered is very large and the prospective attendance on account of the war will be small. Those living near the border may, however, avail themselves of the opportunity of crossing the border before buying through tickets. With a promised concession from the Southeastern Passenger Association the members and visitors will for the first time in many years enjoy low rates from all over the country.

In view of the fact that this is a time when everything is soaring in price and few things coming down, these concessions by the railroad officials should be appreciated. They have been granted expressly to help our cause; for the remote rather than the immediate returns accruing therefrom; in short, to help the country. When attention was drawn to the serious work in which we are engaged, and when shown that ours was not a selfish activity to help the individual but to promote and protect our largest industry, a friendly attitude was immediately displayed toward our appeal for a low rate. It is a grant from big, far-seeing men who deserve our applause. L. A. MERILLAT, Secretary.

MISSOURI VALLEY VETERINARY ASSOCIATION

The 23d semi-annual meeting of the Missouri Valley Veterinary Association held in St. Joseph Mo., February 14, 15 and 16 has been pronounced the most generally successful of any meeting in the history of the association. The meeting was held in the St. Joseph Veterinary College, whose auditorium provided ample room for the general sessions, the class rooms and laboratories provided splendid facilities for the various exhibits, and the well lighted clinical amphitheatre was well adapted to its use for clinical demonstrations, with a minimum of inconvenience to the members. Another outstanding advantage of the meeting place was the freedom from the distractions always more or less in evidence when meetings are held in hotels in the heart of a busy city.

After a hearty welcome had been extended by Mayor Marshall and a fitting response made by Dr. N. S. Mayo, President R. C. Moore read a brief address on the work and policies of the organization.

The program proper was opened by Dr. A. Eichhorn, who read a very comprehensive paper on "Biologic Therapeutics". This paper clearly set forth the principles of immunity and dealt specifically with the various groups of biologic agents.

Dr. T. P. Haslam, presented, "Improved Methods of Immunizing Against Blackleg", in which paper he discussed the shortcomings as well as the merits, of blackleg vaccine, serum and virus immunization and, lastly, the new germ-free or aggressin method. Dr. G. A. Johnson presented an interesting paper, "Immunizing Live Stock", which was followed by another entitled "The Proper Administration of Blackleg Serum and Veterinary Biologics", by

S. E. Houk. Dr. H. Preston Hoskins next gave the results of experiments as to the modes of transmission of hog cholera. Some very startling results were reported among which were the failure of hogs to become sick when fed upon the feces of other hogs suffering from acute cholera, while on the other hand, infection was transmitted to animals in screened quarters where no discoverable agency of transmission existed.

The evening session of the first day was thrown open to the general public and was well attended. Dr. H. DeLamater, Health Commissioner of St. Joseph, gave a talk on tuberculosis in which the gravity of this disease from the health commissioner's standpoint was detailed. He urged segregation and proper quarantine of human sufferers for the protection of their families and the public in general, as well as a close check on bovine tuberculosis with its attendant dangers to human health. Mr. H. F. McDougal, Editor of *Profitable Farming* gave an illustrated talk on dairy sanitation as seen by the layman interested in a clean milk supply. He simply added another chapter to the story of the filthy dairy and the futile efforts of a community to get a clean product without an aggressive campaign of education, supported by adequate ordinances, efficient inspectors and an aroused public sentiment.

Dr. S. Stewart described the recent outbreak of Vesicular Stomatitis in the Kansas City Stock Yards, illustrating his paper with photographic views of cases.

The second day's program was opened by a series of case reports by Drs. R. P. Poage, W. E. Neil and G. F. Jungerman. Each was appropriately discussed. Dr. R. P. Lyman rendered an excellent paper on "Parasites of the Digestive Tract". Dr. C. E. Cotton gave a very valuable paper on "Sterility in Cows". His wide experience in the application of the Williams plan of treatment made his discourse lucid and intensely practical. "Artificial Insemination" by Dr. W. E. Stone excited a lively discussion as to origin of the method, a number of members setting forth claims of priority. The discussion was stopped before anyone had attributed the establishment of the system to Adam or even to Jacob. "Sterility in Mares" was well handled by Dr. F. F. Brown. He covered the economic phase of the question as well as the etiology and treatment in a thoroughly practical manner.

Two illustrated papers on the use of the X-Ray proved among the most interesting of any on the program. In the first, Dr. H.

E. Kingman dealt more especially with the examination of the bones in cases of fracture and exostoses such as ring-bones, bone spavins, etc. Some interesting anatomical studies from injected subjects were also shown. Dr. H. S. Murphey showed a set of 60 slides covering principally the anatomy of the teeth and sinuses of the head. His radiographs and direct photographs were of excellent quality.

Dr. C. J. Norden presented "Dionin in Ocular Diseases". This agent he believes very valuable in promoting the absorption of extravasates and in clearing up opacities of the cornea and aqueous humor. Dr. A. T. Kinsley gave a characteristically clear discussion of "Corn Stalk Disease", calling attention to the identity of this disease and hemorrhagic septicemia in many outbreaks. Dr. L. D. Brown read a paper on "A Comparison of the Various Tests for Tuberculosis". He discussed the thermic, ocular and intradermal methods and from extensive experience favors the latter as being the most positive as well as the most convenient.

A delightful banquet, well attended by the members and their wives as well as by a number of prominent citizens, was held at the St. Francis Hotel. Talks of a non-technical character were made by men from such widely separated states as New York, Mississippi, Michigan, Nebraska and Missouri. Musical numbers by a splendid mixed quartet were interspersed. Dr. R. F. Bourne presided as toastmaster.

The last day was devoted to the clinic. Dr. L. A. Merillat conducted the surgical clinic; Dr. Joseph Hughes the diagnostic clinic. The Bemis operation for establishing dental anesthesia was described by the originator, Dr. H. E. Bemis. Dr. George B. McKillip demonstrated the cauterization method of treating roaring. This was done so quickly that it was over before many present realized it had been begun. Dr. C. E. Cotton demonstrated the treatment of sterility in cows described in his paper of the previous day. Among the cases for diagnosis were several lame animals, two cows with suspicious enlargements in the throat region, and others. Altogether thirteen cases were presented.

A mid-day luncheon was served to the men as well as the ladies and the usual group photograph taken. A rising vote of appreciation was given for the royal entertainment provided by the St. Joseph members, a vote in which all present would have stuffed the ballot box had there been an opportunity.

R. F. Bourne, Secretary.

ALABAMA VETERINARY MEDICAL ASSOCIATION

The tenth annual meeting of the Alabama Veterinary Medical Association met in the Veterinary College of the Alabama Polytechnical Institute, February 23 and 24, 1917.

After the opening exercises, the reports of the officers and the reception of new members, the regular program was started.

Dr. W. W. Webb read a paper on "Veterinary Problems". He discussed a number of general problems that confront the average practitioner. Dr. F. P. Woolf of Mobile considered the question, "How to Improve the Milk Producing Dairies of Alabama". Closer co-operation of the inspector and producer should bring about improvement in the milk supply of Alabama. Dairymen should be taught how to produce clean, pure milk. An inspector should teach as well as enforce the laws.

"Vesicular Stomatitis" was reviewed briefly by Dr. D. A. Piatt. This led to some remarks by the members present on the method of making a differential diagnosis. "Hemorrhagic Septicemia" by Dr. D. J. Meador and "Corn Stalk Disease" by Dr. E. D. King were discussed together. Dr. White of Tennessee contended that Corn Stalk Disease was mechanical in nature, being caused by dry, hard, irritating stalks and that it was not a type or form of hemorrhagic septicemia. Others seemed to think both were due to the *Bacterium bovisepticus.*

A general discussion of "Contagious Abortion" was led by Dr. C. A. Cary who reviewed the more recent literature of Hess, Bang, Williams, Schroeder, Eichhorn and others. That there is confusion and conflict of ideas and theories, there is no doubt, and that much is to be done before safe and rational prevention and cure can be assured. Let the B. A. I. concentrate its money and efforts and establish or determine more definite facts about the cause, the modes of transmission, the pathology, the lesions and the prevention.

Dr. George R. White gave the differential lesions and characteristics of hog cholera, cotton seed meal poisoning, salt poisoning and lye poisoning. Diagnosis of anthrax from a laboratory standpoint was reviewed by Dr. R. S. Sugg. He suggested that an ear, or dried blood smears on a glass slide and clean paper could be sent to the laboratory for diagnostic use. Never send blood in bottles or soft tissues because the anthrax bacterium is often destroyed in such liquid or tissues and are liable to be broken in the mail or in

transit. The ear or blood exposed to air permits the formation of spores and thus permits the securing of living cultures, inoculations and a positive or negative diagnosis. The diagnosis must depend upon stains, cultures and inoculations. It is unsafe to make a diagnosis upon a microscopic examination of a stained slide smear. It is well to note that Alabama does not permit the use of anthrax vaccine until an authoritative bacteriological diagnosis is made. Anthrax serum can be used while such diagnosis is being made.

Dr. F. P. Caughman of Columbia, S. C. reported (a) A questionable case of parturient paresis that failed to recover by the ordinary treatment. (b) Mule with hemorrhage from the bladder following catheterization. Penis became swollen and pendent. Mule died on seventh day revealing on autopsy a blood clot in the bladder, nephritis and enlarged prostate.

Dr. I. R. Cooper reported a case of uremic poisoning in a bull, buckeye poisoning in a hog and seventeen cases of forage poisoning, five of which recovered. Dr. White did not believe that hogs were poisoned by buckeye because he had seen hogs eat buckeye without showing any toxic symptoms.

Dr. G. C. Bevan reported that he had good results in treating tetanus by giving in the feed one-half ounce of a mixture of equal parts of glycerin and carbolic acid, and also giving every other day one dram of barium chloride. He also reported a thoracic wound in a colt where a portion of the lung protruded. He replaced the extended lung and stitched up the wound but the colt died in six weeks from colic.

Dr. I. S. McAdory exhibited (a) the stomach of a mare with a piece of weed extending through the stomach wall. The mare had died of peritonitis. (b) The dilated esophagus of a mule. The dilation was located in the posterior portion near the diaphragm. The mule lived some time, being fed through a stomach tube. The mule could not swallow liquids or solids.

Dr. E. D. King reported that he secured recoveries in sore mouth in dogs when he treated the cases in early stages by giving ten grains of thymol on an empty stomach and repeated the dose in two hours following with a dose of salts in six hours. Dr. W. L. Ingram exhibited a photograph showing a mule and the crutch that he used in a metacarpal compound fracture. He said the mule was making a good recovery. At night, before the banquet, Dr. White gave an illustrated lecture on castration of cryptorchids.

At night the banquet given by the students Veterinary Medical Association was held in the Smith Dining Hall. The toast speakers were numerous, wise and witty. It was a feast of food, fun and reason. From all points this banquet was a success.

The morning of the 24th was devoted largely to an inspection of the State Serum Plant and to a more careful examination of the new slaughter house. This house is located in the suburbs of Auburn on a hillside where animals to be slaughtered can walk from the ground into the second story killing floor. The floor space is 20 by 50, with the lower story made of cement and the upper story of brick. The killing floor is made of re-inforced concrete. Hoists, killing and bleeding pens, scalding vats, over head tracks, entrance and exit scales are found on the killing floor. In the lower story are new type rendering tank, engine, and storage room. The boiler is located under a separate roof. A brick smoke stack forty feet high stands near the boiler. This plant cost something less than five thousand dollars without cold storage. Two thousand dollars more would supply cold storage and then such a slaughter house would be fully equipped for taking care of all the slaughtering of any small city of 2000 to 10,000 people.

A polyclinic was held at the Veterinary College. The first case was a two year old colt with congenital contraction or shortening of the perforans tendon in each front limb. The heels were high and the toes short and the deviation from the normal axis occurred at the distal phalanx. The veterinarians present differed some as to method of treatment. Some advised tenotomy, others cutting down the heels and applying toe clips. The owner decided in favor of toe clips and Mr. Schimmel, a senior veterinary student, trimmed the foot and applied the tip shoes.

Puncture over the internal superior part of the os suffraginis was inspected by Dr. Piatt and Dr. Ingram.

Drs. Kendrick, Bevan and Seibold examined and made a diagnosis of multiple fibroid tumors in left rib region. At first it was called bursatti. Operative treatment was advised.

A clinical and microscopic diagnosis of actinomycosis in a Jersey cow.

An enlarged perforans tendon just above the fetlock of a hind limb was present, having been treated by cold water bandages. Dr. Piatt advised light blister and bandage.

A mule with tetanus was next presented to the veterinarians.

This case had existed 20 days or more and was making a good recovery with no other treatment than laxatives and good care.

A recovered case of fistulous withers was next exhibited. This case had been treated successfully inserting Merillatt's drainage tube.

Dr. Cary exhibited a large mule that had been operated on for ventral hernia three days prior. The many tailed bandage and cotton dressing were removed and the redressing process done so as to show the method of handling such cases after the hernial operation. The mule exhibited some nasal discharge resulting from the irritation of the chloroform. The absorbent cotton covering the place of operation was saturated with a sero-purulent discharge and there was only a slight rise of temperature. The details of the operation were explained by the operator.

The next case was a mule with pulmonary emphysema.

A one year old mule was cast by the Miles method and castrated by Dr. White. Another mule was cast and castrated by Dr. White. The special point brought out by the operator was the necessity for removing part of the tunica in order to prevent "water bags" that are so often seen in mules castrated without including the tunica vaginalis in the emasculator.

Dr. Geo. R. White castrated a stallion standing in five seconds counting from the time he grasped the scrotum until the time the testicles were on the ground.

Gray mare with septic fibrous or interstitial mastitis. Dr. F. P. Caughman advised removal of the half involved.

Pointer dog with injured pelvis.

C. A. Cary, Secretary.

KEYSTONE VETERINARY MEDICAL ASSOCIATION

The regular monthly meeting of the Keystone Veterinary Medical Association was held in the Philadelphia Chamber of Commerce, Widener Building, our new meeting headquarters, on Tuesday evening, April 10th, 1917, at 8:30 P. M. Good attendance.

A very interesting paper was given by Dr. J. W. Van Sant on "Some points in Obstetrics". This was thoroughly discussed by several members.

Dr. Yunker made a motion that the association take out a membership in the Chamber of Commerce, which will be voted on at the next meeting.

The Secretary was directed to write a letter to His Honor, Mayor Smith, informing him that there had been a committee appointed for the purpose of conferring with him in reference to the Philadelphia Home Defense Reserve. The committee appointed was Drs. Kelly, Crocker and Rockwell.

Dr. E. S. Deubler and Dr. E. Linwood Cornman were elected to membership in the Association.

Meeting adjourned at 11:30 P. M.

C. S. Rockwell, Secretary-Treasurer.

SOUTHEASTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

Veterinarians of Macomb, Oakland and Wayne Counties met in Detroit, Saturday afternoon, March 17, 1917, and organized the Southeastern Michigan Veterinary Medical Association. There were thirty-one veterinarians in attendance, including Dr. Geo. W. Dunphy, State Veterinarian; Dr. Ward Giltner and Dr. E. T. Hallman, from the Michigan Agricultural College; Dr. Clark H. Hays and Dr. Newton, Veterinary Field Agents of the Bureau of Animal Industry; and twenty-six veterinarians from the three counties named.

The meeting was held mainly for the purpose of getting organized, so there was no set program. A constitution and by-laws was drawn up and adopted. Addresses were made by Drs. Dunphy, Hallman, Giltner, Newton and States. Dr. Joseph Hawkins acted as temporary chairman until officers for the ensuing year were elected as follows: President, Dr. James J. Joy, of Detroit; Vice-President for Oakland County, Dr. J. W. Baldock, or Birmingham; Vice-president for Macomb County, Dr. J. Black,of Richmond; Vice-president for Wayne County, Dr. E. P. Schaffter, of Detroit; Secretary-Treasurer, Dr. H. Preston Hoskins, of Detroit.

The members of the State Live Stock Sanitary Commission were elected to honorary membership in the association. The next meeting will be held in Detroit, April 11, 1917.

H. Preston Hoskins, Sec'y-Treas.

MASSACHUSETTS VETERINARY ASSOCIATION

The November meeting of the Massachusetts Veterinary Association was held at the Quincy House, Boston, on November 22.

The meeting was called to order by President Pierce. The records of the September and October meetings were read and approved.

The application of Dr. C. H. Hamblet of Lowell was received and laid on the table for one month.

The following members were elected to membership after the secretary cast one ballot for each applicant in accordance with the motion made by Dr. Seale and seconded by Dr. Mason:

Dr. Francis W. Austin
Dr. Ralph Wilson Balkam
Dr. W. H. Boswell
Dr. Edwin J. Castle
Dr. Geo. S. Cobb, Jr.
Dr. Geo. S. Jordan
Dr. Charles A. Kenne
Dr. John H. McAllister
Dr. Angus A. McDonell
Dr. Mark L. Miner
Dr. Ralph Roy Moulthrop
Dr. Henry E. Paige
Dr. Andrew G. Potter
Dr. Richard N. Shaw
Dr. Frank Holden Smith
Dr. A. H. Streeter
Dr. Milton H. Williams

Under new business, Dr. Gilbert proposed the subject of a legislative committee, and spoke as to the advisability of the same. After considerable discussion, it was moved by Dr. R. W. Smith, seconded by Dr. Gilbert, that a committee of three be appointed to be known as the legislative committee. Carried.

The Secretary spoke regarding the necessity of more applications for membership, and the fact that it was quite surprising to find that new members were secured with so little endeavor on the part of members. After urging that all members concern themselves in this direction, he moved that a committee of three be appointed to be called the membership committee, whose duty it would be to secure applications for membership. Seconded by Dr. Seale. Carried.

After the business meeting, we were entertained by Dr. W. T. White, who read from his diary, and spoke extemporaneously on his experiences and observations in things veterinary, while at El Paso, Texas, with the artillery. He spoke particularly on the complications found with influenza and purpura hemorrhagica, innumerable colics and deaths which were attributed to the earth which was eaten. He spoke of the excellent effects which had been derived from the use of streptococcic vaccines and leucocytic extracts.

Dr. W. H. Shannon followed Dr. White, and gave us a most interesting talk on his experiences on the border. He spoke particu-

larly on the social features of a soldier's life. One of the most interesting things mentioned by either of the speakers was the fact that the only militia veterinarians on the border who had received their commissions were the Massachusetts men.

A rising vote of thanks was extended to Drs. White and Shannon, and we adjourned at 8 p. m.

EDWARD A. CAHILL, Secretary.

DECEMBER MEETING

The December meeting of the Massachusetts Veterinary Association was held at the Quincy House, December 27, 1916. Meeting was called to order by President Peirce, who introduced Dr. W. T. Porter, Professor of Physiology of the Harvard Medical School. Dr. Porter has recently returned from France, where he has been making a special study of shock. He related at considerable length his experiences in the war zone, and related more briefly the procedure being followed by Carrel in the treatment of wounds under his new method which is achieving such wonderful results.

The outstanding feature of his remarks was that practically all cases which are sent to the Carrel Hospital are cases which are given up as hopeless in other hospitals, and that the patients are in such a condition upon arrival that it resembles a butcher shop rather than a hospital. Notwithstanding this fact, the percentage of recoveries is greater than at any other hospital in France. Briefly, an outline of Carrel's method is that after ordinary cleansing preparation, several small tubes resembling setons are placed throughout the wounds, and all of these tubes are connected with an overhead container which allows frequent irrigation of these wounds. Irrigation is thus carried on practically every two hours. Even more remarkable than this, is the fact that Carrel and his assistants have been able to work out a scale of cicatrization, which is as accurate as any scale known to medicine. Thus, if on Wednesday of this week a patient has a wound measuring 50 centimeters, they are able to figure accurately at the time of first treatment what the surface of the wound should measure a week or two weeks from that date. If the healing process does not correspond with this scale, they know immediately that something is wrong with the treatment, and are able to locate the same.

Following Dr. Porter's remarks, a rising vote of thanks was extended to him.

The minutes of the November meeting were read and approved.

The application of Dr. C. H. Hamblet of Lowell was then acted upon. Moved by Dr. Gaw, seconded by Dr. Paquin, that the secretary cast one ballot. Carried.

The following applications were received:

Dr. John H. Gardner, Wollaston,
Dr. H. H. Delano, Boston,
Dr. Charles W. Delano, Boston.

They were laid on the table for one month.

A letter was read by the secretary from Dr. Mulvehill, which was in response to a letter from the secretary, and which thanked the association for its expression of sympathy at the time of the illness of his son.

New Business. The President nominated the following committees:

Legislative Committee: Dr. John McAllister, Dr. C. H. Paquin, Worcester; Dr. Harry Kingman, Boston.

Membership Committee: Dr. Elmer Babson, Gloucester; Dr. Harry Lukes, Springfield; Dr. E. L. Hannon, Pittsfield.

E. A. CAHILL, Secretary.

THE UNITED STATES COLLEGE OF VETERINARY SURGEONS ALUMNI MEETING

The Alumni Association of The U. S. College of Veterinary Surgeons held its 21st Annual and Smoker at The Raleigh Hotel, Washington, D. C., Friday evening, April 13th. Sixty-five graduates attended and were entertained by Maj. Jarrell Griffith U. S. A. Vet Corps, who spoke on the advantages of the Army. Dr. J. G. Ferneyhough, State Veterinarian of Virginia, Dr. H. J. Holt, Chief Veterinarian of West Virginia, and Dr. H. P. Flowe, Asst. State Veterinarian of North Carolina spoke with reference to their respective states.

Local entertainers furnished the social program, which was appreciated by all those attending. A buffet luncheon was served and appropriate souvenirs were distributed.

The following men were graduated in the 1917 class and were elected into membership of the association: Messrs. I. A. Arnold, Virginia; L. Avery, New York; J. W. Baker, Maine; M. A. Bosley, D. C.; Wm. Campbell, Johnson, Vt.; Perry Dykes, Aiken, S. C.;

R. L. Getz, Virginia; J. L. Hartraft, D. C.; Wm. Harvard, N. C.; L. H. Hicks, Va.; J. R. Hutchins, N. C.; Wm. H. Houston, D. C.; E. D. Hudson, Penna.; N. G. Hutton, Va.; H. S. Lucas, D. C.; J. B. McClellan, D. C.; E. J. McCoy, N. C.; A. F. Malcolm, Va.; J. J. Martin, R. I.; Wm. G. Melchiorsen, Neb.; E. J. Moyland, Md.; J. S. Nicholas, Virginia; E. J. O'Hara, D. C.; R. Randall, D. C.; T. Spresser, D. C.; T. W. Udy, Penna.; T. V. Ward, D. C.; L. C. Wambaugh, D. C.; F. Zerkle, Ohio.

The following officers were elected: Dr. H. S. Gamble,'08, President; Dr. Harry Lucas,'17, Vice-President; and Dr. C. M. Mansfield,'07, Permanent Secretary and Treasurer.

The next meeting will be held in Washington during April, 1918.

C. M. Mansfield, Sec'y.

COMMUNICATIONS

"SAND COLIC"

Editor Journal of the American Veterinary Medical Association: Ithaca, N. Y.

Dear Sir: Among the "European Chronicles" and under the head of "Sand Colic" I note an interesting little article in your March issue.

Evidently the author has heard of the condition, "Sanded" or possibly has rubbed up against a mild case or two but if he should visit Florida I think he might still find a few cases of the real thing.

A few years ago, while we still used mules and horses as a means of transportion in this part of the world, it was quite common, and I still occasionally meet the condition among cattle. In cattle the most common point of impaction is the omasum and this will become a solid mass of cement which surely kills.

Out of many cases, I have three good, post mortem demonstrations; two in horses where the impaction was in a single loop of the small intestine. In one case the mass weighed 52 pounds, in the other 70 pounds, and the intestine was dilated to a foot or more in diameter. The third case was in a large gray mule which the owner said had been subject to mild colics for a year or more. When she was brought to me there was no trouble with a diagnosis and I told the owner that nothing I knew of, except a long handled shovel, would move the mass. My prognosis was a fatal termination and she proceeded to die during the next twenty-four hours. On post mortem the cecum contained something more than 100 pounds of clear, white sand, packed like cement.

One feature of these cases is that the food mass will, for a long time pass over the obstruction. I have, on one occasion, recovered an ounce aloes bolus from the rectum that had been administered per orem, a day or so previously and had not even dissolved.

With us it is not uncommon for any of the larger animals to get a habit of licking up sand, just as they would salt; and this is done where salt is kept constantly before them. In thirteen years practice I have found only one successful method of treatment and that is prophylactic. A pound of whole flaxseed fed once each week to a horse, mule or cow and the owner can forget about "sand". In my experience, high and copious irrigation against such a mass as sand impaction forms, is more than apt to result in a ruptured intestine and I have found it better practice to let the animal die, if it has to, than to let the owner see you kill it, trying to save.

FRED W. PORTER, D.V.M., Tampa, Fla.

REVIEW

A LABORATORY GUIDE IN MATERIA MEDICA AND PHARMACY

HOWARD J. MILKS, D.V.M., Author and Publisher,
Ithaca, N. Y. Price $1.50.

This book, containing about one hundred printed pages which are interleaved with blank sheets, represents in printed form the notes which have been used for several years in teaching pharmacy and materia medica to the students at the New York State Veterinary College at Cornell University.

It is composed of twelve chapters, divided into two main parts. The first part taking up: definitions, metrology source and composition of drugs, pharmaceutic methods, incompatability, and dispensing of drugs. The second part, or pharmacy proper deals with the more important official and non-official preparations, as to definitions, ingredients, methods of manufacture, and their principal uses.

The subject of materia medica and pharmacy is an important one to veterinarians since they prepare and dispense a great many of their own medicines, and with this idea in mind the author has compiled this book to best meet the requirements of the student along this line.

W. E. M.

NECROLOGY

CHALKLEY H. MAGILL

Dr. Chalkley H. Magill graduated at the University of Pennsylvania, Department of Veterinary Medicine in 1889. He practiced veterinary medicine in Philadelphia for about ten years. He was demonstrator of surgery in the Veterinary Department during the sessions of 1892 and 1893. Dr. Magill was born in New Hope, Buck County, Pa. in 1854; died February 9th, 1917, sixty-four years of age. After retiring from active practice in 1900 he was engaged as a real estate assessor of the Board of the Revision of Taxes in Philadelphia. He was a brother of the late Judge Edward Magill, and a man of exceptionally good qualities and was always held in the highest esteem by those who knew him.

OTTO G. NOACK

Dr. Otto G. Noack died March 27th, 1917. He was born in Heilsberg, Germany. He graduated from the Berlin Veterinary College, came to this country in 1887 and established an office at that time at 54 S. Sixth Street, Reading, Pa., where he lived up to the time of his death. Dr. Noack was a member of the Olivet Presbyterian Church; Loyal Order of Moose; The Elks; The American Veterinary Medical Association since September 22nd, 1903; the Schuylkill Valley Veterinary Medical Association and the Pennsylvania State Veterinary Medical Association. He received the degree of fellow and was a member of the United States Veterinary College of Washington, D. C. Dr. Noack was always active in political questions. He was one of the agents of the State Livestock Sanitary Board and served in this capacity since the work of Meat Hygiene was organized in 1907. In the last outbreak of foot-and-mouth disease in Pennsylvania he had charge of the eradication of foot-and-mouth disease in his district for the state, while Dr. Hawley represented the Bureau of Animal Industry; both men worked together harmoniously and accomplished the best of results in their territory. Dr. Noack is survived by his wife and one small son.

A. F. SCHREIBER

Dr. A. F. Schreiber was one of the best known veterinarians in Philadelphia. He died on March 6th, 1917, aged fifty-six, in St. Mary's Hospital, from blood poisoning, resulting from an amputation for gangrene of the foot. Dr. Schreiber graduated from the Veterinary Department of the University of Pennsylvania in the class of 1888. He was engaged in private practice at 62nd and Elmwood Avenue, Philadelphia, since his graduation. At the time of his death he was Chief Meat and Cattle Inspector, Bureau of Health, of Philadelphia. He had been connected with the Bureau of Health for over twenty years. He was a first class veterinarian and with his jovial disposition had many friends.

J. C. PARKER

Dr. J. C. Parker died at his home on North Main St., St. Albans, Vt., March 18, after five weeks of illness, which began with septic sore throat, developing streptococcic infection from which his death resulted. Dr. Parker was born in Plymouth, England, August 24, 1863. He was the son of John and Eleanor Mary Parker. With his parents, he came to Montreal when nine years of age; was educated in the public schools and took a three-year course in comparative medicine at McGill University and graduated in 1897 with the degree of D. V. S. Soon after graduation he located at St. Albans, Vt., and has practiced there until his death. He was a member of the Vermont Board of Veterinary Registration and Examination and of the Vermont Veterinary Medical Association. Dr. Parker was a recognized authority on horse handling and handled many pairs of high class horses for market. In March 1888, he married Rebecca Thomas of Mooers, N. Y., who, with a daughter, Mrs. L. C. Robinson of Rutland, Vt., survives him; also two brothers, S. H. Parker of Preston, Ont., and E. P. Parker of Montreal. Dr. Parker was a successful veterinarian with a large practice and was a man of sterling character and honest principles.

GEORGE STEPHENS.

MISCELLANEOUS

Dr. Carl E. Freeman has removed from Carrizozo, N. M. to White Oaks, N. M.

—Dr. H. D. Gill has associated himself with Dr. McNeal (M.D.) in the New York Biological Products Company for the preparation and sale of biological products.

—Dr. and Mrs. A. O. Rustad, Fergus Falls, Minn. welcomed the birth of a son April 19.

—The next meeting of the Colorado Veterinary Medical Association will be held May 31st and June 1st at Fort Collins.

—Dr. Edward Lapple has removed from Sioux City, Ia. to East St. Louis, Ill.

—Dr. J. J. Frey of Chicago, Ill. has removed to Sacramento, Calif.

—Dr. Charles A. McKim has removed from Lincoln, Neb. to Windsor, Colo.

—Dr. F. I. Pogoda from "Some place in Mexico" has been transferred to Troup "B" 5th Cavalry, Fort Sheridan, Ill.

—Dr. F. T. Kocher has removed from College Park, Md. to Orangeville, Pa.

—Dr. George H. Hart, formerly city veterinarian of Los Angeles, has been appointed associate professor of veterinary science at the University of California. Dr. Hart began his work in Berkeley on April 1.

—Dr. F. A. Nelson's term as State Veterinarian of Indiana ended March 22. Dr. L. E. Northrup has temporary charge of the office.

—It is reported that through Dr. J. G. Ferneyhough, State Veterinarian, and Dr. Thomas Fraser, the Virginia State Veterinary Medical Association has tendered its services to Governor Stewart in connection with the war.

—The next meeting of the California State Veterinary Medical Association will be held June 13 and 14 at San Francisco, Cal.

—The next meeting of the Hudson Valley Veterinary Medical Association will be held at the New Saulpaugh Hotel, Catskill, N. Y., May 2.

—At a special meeting of the West Virginia Veterinary Association, plans were made for the annual meeting to be held at Parkersburg July 5 and 6.

—It is reported that the veterinarians of the Live Stock Sanitary Board of Pennsylvania have completed an examination of 971

horses which the Pennsylvania troops of cavalry and batteries of artillery brought back from the Mexican border.

—Dr. L. P. Beechy, a graduate of the Ontario Veterinary College, has been added to the Agricultural Extension Department of the Ohio State University. He will act as general extension specialist in veterinary medicine.

—Additional veterinary inspectors have been added to the tick eradication forces in the Southern States as follows:

Jackson, Miss., Drs. J. S. Reno, Cleo L. Lash, Charles E. Morris, D. J. Bynacker, and E. H. Aicher.

Atlanta, Ga, Dr. Audrey D. Moore.

Jacksonville, Florida, Dr. Samuel V. Ramsey, Jr.

Little Rock, Ark., Drs. H. P. Waddle, Floyd C. Reid and Charles F. Rathbun.

—Additions have been made to the forces of veterinary inspectors of the Bureau of Animal Industry engaged in dourine eradication as follows: At Bismarck, N. Dak., Drs. Israel Wallman, Homer O. Keyes, William S. Newman, Edward H. Jewett, Jr., W. Clyde Mitchell, Norman A. Evans, William A. Lyon, R. E. Duckworth, Garrett J. Roosink and Burl O. Fisher.

At Denver, Colorado, John J. Staab, Cyrus H. Ames, Guy E. Abrams, F. H. Schleich and Jefferson Robinson.

At Albuquerque, New Mexico, Carl F. Lipp, James E. Dwyer.

—The following assignments have been made in the inspectors in charge of federal meat inspection stations:

Dr. C. F. Payne, Denver, Colorado.

Dr. J. C. Exline, Walla Walla, Washington.

Dr. Clinton B. Weagley, Frederick, Maryland.

Dr. William Hamilton, Cheyenne, Wyoming.

Dr. Lineus H. Allen, Terre Haute, Indiana.

Dr. C. L. Norris, Wheeling, West Virginia.

Dr. L. C. Butterfield, Reno, Nevada.

-The following officers were elected at the last meeting of the Ohio State Veterinary Medical Association: Dr. Harry Moss, Dayton, president; Dr. A. D. Fitzgerald, Reynoldsburg, vice-president; Dr. F. A. Lambert, Columbus, secretary; Dr. D. S. White, Columbus, treasurer. The next meeting will be held at Columbus, January 10 and 11, 1918.

Dr. J. P. Foster, formerly of Bangor, Me., is now located at Huron, South Dakota.

JOURNAL
OF THE
American Veterinary Medical Association
Formerly American Veterinary Review
(Original Official Organ U. S. Vet. Med. Ass'n)
PIERRE A. FISH, Editor ITHACA, N. Y.

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions.

Fifty reprints, without charge, if requested in advance, will be furnished to authors of original articles accepted for exclusive publication.

VOL. LI., N. S. VOL. IV. JUNE, 1917. NO. 3.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

PROCRASTINATION

Lord Roberts, for years, endeavored to get England prepared for the war, which his clear vision discerned as a possibility. Superior myopic individuals overruled him and as a result England has suffered a serious loss in valuable lives and a great amount of money. Adequate preparation, if it had been made in time, would have saved many of these lives as well as the money. If in 1914, England had possessed one-half of the efficiency she has shown thus far this year, there would probably have been no war or it would have been of relatively short duration and her resources would have been much less impaired.

What Lord Roberts tried to do for England, General Leonard Wood has tried to do for America. No one in this country has had a better knowledge of the conditions of our unpreparedness and it should be to his eternal credit that, so far as he has been permitted, he has done all in his power to prepare and protect this country from the perils that threaten it. Because there have been some atrophied intellects we are in a fair way to render some unnecessary human and financial sacrifices, although endeavoring at the last hour, to avoid so far as possible the mistakes of others.

The British navy and the French and British armies are now practically our first line of defence. We are protected by their sheltering wings and in the meantime we are leisurely taking measures to protect ourselves.

Involved in the general dilatoriness is the army veterinary service. There have been prophets among the veterinarians. Some have been clear sighted enough to see that the present service was entirely inadequate for any sudden expansion of the army and have endeavored to provide against such a contingency. The danger of unnecessary loss of animal life and the money involved is comparable with the human loss. Those who would avert this are bound by the red tape of inactive legislation. Years of effort have been spent in securing proper recognition for the services of the army veterinarians, but further recognition for a veterinary reserve corps for animal relief, which in time of war would seem to be just as essential as a medical reserve corps for human relief, has not as yet received definite legislative sanction. With the greatly increased size of the army, hundreds of additional properly qualified veterinarians will be required. It is very improbable that this country can begin to supply the necessary number for the regular service with its rather rigid tests and restricted age limits. It is only through a reserve corps, in which the tests and the age limits are more elastic, that it can be hoped to secure the number needed, and since the work is so similar it is only reasonable to expect that this corps should be established on lines similar to those of the medical reserve corps.

It is reported that this government is basing its plans, not upon a speedy termination of the war, but upon the possibility that it may continue one to three years longer. This seems to be a wise provision and it would seem to be equally wise, so far as the veterinary branch is concerned, that if a right start is effected, fewer mistakes will be made, fewer losses will occur and fewer regrets will arise to reproach us for past inefficiency.

It is also reported that England is calling for more veterinarians, although the number she has in the field overwhelmingly overshadows our own supply. If the war continues much longer, as indications seem to show that it will, many more veterinarians will be needed here, and in the general scheme of preparedness it should be the duty and the effort of the veterinary colleges to meet this demand by supplying as many properly qualified graduates as

may be required. The demands of war are oftentimes sudden and imperative. There are also civic demands to consider, for all veterinarians can not go into the army. The non-enlisted veterinarian may render valuable service to his country by striving, as never before, to conserve the health of the stock in his community and to assist in safeguarding and augmenting the food supply upon which the armies and non-combatants must depend.

P. A. F.

THE VETERINARY RESERVE CORPS

An editorial in the May number of this Journal calls attention to a very serious situation in the lack of a Veterinary Reserve Corps in the United States Army. It appears from that editorial that young men, 21 to 27 years old, may enter the army service as veterinarians with the rank, pay and allowances of second lieutenants, but that the more experienced and more mature veterinarians who are more than 27 years old can only enter the veterinary service with the pay and allowances of a second lieutenant, but without rank. The situation thus created is so impossible and so absurd that the writer of the editorial referred to comes to the distressing conclusion that veterinarians over 27 years old who wish to serve their country should enter the infantry, cavalry or some other branch of the service, but not the veterinary service.

If the present situation is unalterable, this conclusion is probably sound. In a world in which rank is an accepted institution, there are positions in which rank becomes vital and essential.. Disregarding the fact that rank is superficially regarded as something that carries certain rights and privileges, insignia and other trappings—things dear to the heart of the average person, even to most of the democratic souls that openly scorn such baubles,—the fundamental and essential purpose of rank is to give authority to those who assume the responsibility. The care of the army horses of the republic is a big responsibility, involving a large monetary investment—with all that such investment means in taxes to pay the bill, and carrying with it the possibility of victory or defeat in the form of cavalry well mounted or cavalry handicapped or disqualified for service by horses out of commission. The veterinarian does not stand in a purely advisory relation to these horses; neither is he a stable hand. His position is an executive position

with responsibilities for results. It is absolutely essential that he be in a position to take measures to secure these results, unhampered by whim or interference on the part of persons who have authority over the veterinarian without responsibility for the veterinary results.

The long story of the effort of American veterinarians to secure some small measure of the rank and recognition that is accorded veterinarians in the European armies and in that of our Canadian neighbors, need not be reviewed here. I have been told by a former veterinarian of our army that most of the opposition to that recognition came from the line officers; I have been told by an officer of the medical section of the Officers Reserve Corps that the Medical Corps has fought the recognition of the veterinarian. Granting all this, there is nothing to be gained by throwing bricks at the officers of the line or of the medical service; they are excellent and able men in their own lines. We are confronted with a situation which is not academic to begin with and which will become less so. Is there anything we can do and should do at this time?

Less than a year ago, Congress granted to the veterinarians in the army the privilege of rank, cautiously limiting them to the grade of major after 20 years of service. It appears that men over the age of 27, and even in times of peace this age limit is too low, who might enter the veterinary service in case of war, have in some way been left in the position of the army veterinarian up to a short time ago, i. e., without rank. Now we are actually at war, this absurd situation has just come to light, and one of the most prominent veterinarians in the United States advises us to enter the army in some branch other than the veterinary service if we wish to serve the country. It is in some ways an attractive proposal. By entering an officer's training camp now, one may prepare for service as a line officer with no limit to his possibilities for promotion except his own ability; by going into the veterinary service he becomes neither an officer nor an enlisted man, an attractive prospect for the able and distinguished veterinarians of the United States who are invited in these terms to serve their country by putting their skilled services under the command of their recent students, to give up their practices at the sacrifice of thousands of dollars to take the pay of a second lieutenant without even the rank. It is as true in war times as in peace times that the

laborer is worthy of his hire. The line officers and the medical officers are jealous of their rank and would sacrifice it under no considerations. Why should this sacrifice, with the entailed handicap of ineffectiveness, be demanded of the veterinarian?

But while Dr. Marshall's proposal that we enter the army and avoid the veterinary service is attractive, there are fundamental objections to it. We have learned from Europe's experience the disastrous effects of putting men of special training in the ranks of the fighting forces and withdrawing them from positions where they cannot be replaced. Veterinarians are men of special training; they cannot be replaced as veterinarians overnight or out of hand. Nor is the supply of veterinarians so abundant or the qualities demanded of an army veterinarian so common that this country or any country can afford to sacrifice their services by putting them in the fighting lines. During the first two years of the present great war, the German veterinary periodicals carried every month a list of German army veterinarians killed in action and a list of those that had received the Iron Cross or similar decorations for conspicuous bravery; each of those monthly lists was about as long as the total roster of all the veterinarians in our army; and this was for the German army alone and for men acting in their capacity as veterinarians. Unquestionably the list would have been a much longer one had Germany allowed her veterinarians to do what Dr. Marshall proposes—enter the army as line officers.

At the present time the Veterinary News of London is carrying the following advertisement: "Army Veterinary Corps.—Veterinary Surgeons under 50 years of age are most urgently needed for temporary commissions in the Army Veterinary Corps for service at Home and Over Seas. For particulars apply to Director-General, Army Veterinary Service."

England and Germany, employing their veterinarians as veterinarians, and granting them ranks up to that of general, are short of veterinarians. What does that mean? It means that the horses of the cavalry and field artillery are going unattended or receiving inadequate attention, thereby weakening the efficiency of these arms of the service, that the live stock interests of these and other countries are being inadequately attended to as a result of a shortage of veterinarians, the men trained to attend to these interests. Are we to repeat this experience and intensify it by

taking our services entirely out of the veterinary field and incurring the additional losses that will come from service on the firing line instead of the veterinary service, where European experience indicates that the losses will be severe enough? It does not appear that this is the proper and logical thing to do. Congress is in session and in the mood to consider army legislation; it has been impressed with the need of conserving human and material services and utilizing them where they will be effective; it is apt to listen to proposals for increasing efficacy. A determined effort now to save the services of veterinarians to the country and not waste them by allowing veterinarians to serve their individual interests by entering the line service, may easily lead to valuable and much needed amendments. Even the recognition granted army veterinarians in the recent legislation is inadequate. If we are to have a real war, as it seems we will, it will develop that we have no machinery adequate to cope with the situation as regards care and handling of sick and wounded horses; our veterinarians haven't the assistance that would be essential. A veterinary unit at the front in Europe is composed of about 100 men; we have nothing resembling this.

The special committee of the A.V.M.A. on Army Veterinary Service has conferred with the authorities in Washington and is still using its best efforts to get Congress to write into its laws the suggested amendment providing for a Veterinary Reserve Corps and for an extension of rank that will be more in keeping with the needs of our proposed army and more nearly the recognition which is accorded veterinarians everywhere except in this country. Every veterinarian should write his senator and congressman, asking for these rights. There has been enough discrimination. The American veterinarian is as able and effective as the European. Should we be less intelligent and considerate than Germany, or France or England? Now, when the country is in need of everyone's services, before mistakes are made and veterinary services irretrievably lost, is the time to put the veterinary service of the Army in shape to use and even to attract trained and mature men, at least when war makes it imperative.

M. C. H.

THE VETERINARIAN AND THE FARMER

There has always been a bond of mutual dependence between the veterinarian and the farmer, because the latter is the producer of the patients and the former is often times able to preserve their existence. In a general way their interests are mutual and there should also be a bond of sympathy and trust. As veterinary practice has shifted more and more from city to country limits these bonds have been strengthened. These are general principles but they are more or less influenced by the personal element of the practitioner and client. The question has been so ably discussed recently from the farmers standpoint and given a wide circulation in one of the prominent influential agricultural papers, thereby reaching a large clientele, that it seems equally desirable that some of these excellent views should also be brought to the attention of the veterinarians. The author is so fair minded and free from bias and presents his opinion so lucidly that we shall feel at liberty to quote his statements quite freely.

He establishes the general principle that if worthy of his calling, the veterinarian as well as the stockman must be a lover of animals. Stockmen are demanding a higher type of veterinarian than has been required in the past. The farmers of today are also of a different type from those of the past. Many of them are quite well versed in the cause and cure of disease. When a veterinarian states that navel ill in colts is inherited directly from the dam and that it does not come from infection, the farmer is made skeptical of that man's professional ability and is likely to call a man to treat his animals whose ideas conform to modern standards.

The really successful veterinarian is a stockman at heart. He should be familiar with the ups and downs of the business; with the problems of marketing and feeding, and should be in sympathy with all progressive movements concerning live stock. He should "boost" for the live stock show or for the breeder's club and participate in public affairs. The veterinarian who has been farm-reared has an advantage. The modern veterinary college gives as part of the prescribed curriculum, courses in breeding, feeding and management of live stock and in stock judging.

The veterinarian who takes his farmer patron into his confidence rarely loses by so doing. More likely is he to gain by it. The author had occasion to visit farms with veterinarians. Recent-

ly in company with a young practitioner he called at a farm and the farmer asked the veterinarian to examine a young mare in his barn. The veterinarian explained the condition fully and informed the owner of the mare that the condition was rather serious but would yield to treatment. He instructed the young farmer how to treat the case and said that it would not be necessary for him to call again unless some unforeseen complications should set in. The farmer was highly pleased and has become a very enthusiastic supporter of the young veterinarian whose practice is growing rapidly.

In contrast to this method is another who would seem to have been well qualified for the work of a veterinarian. He held that it was utterly inadvisable to give the farmer any information that might enable him to treat his own animals or to assist in any way in handling the case. He would talk freely concerning any other subject, which in itself led the farmer to feel that the veterinarian's first interest was not with his live stock. The practice of this particular veterinarian never grew to any extensive proportion. Finally he decided that conditions were against him and left to take up practice in a new location. Each veterinarian must contend with the parasite who would treat his animals from advice he would obtain free. Tact and diplomacy are necessary on the part of the veterinarian, and it is a hopeful sign that the great majority of stockmen are very willing to pay for the professional service.

Stockmen prefer the veterinarian whose integrity is unquestionable. It is observed in the examination of stallions for state enrollment that the veterinarian who will allow nothing to influence his judgment is the one whose services are in demand when an emergency arises. The veterinarian who might overlook an unsoundness or abnormal condition for the sake of retaining the good feeling of a patron is very likely to lose rather than to gain. In one instance a stallion was taken to a veterinarian who pronounced him unsound. The owner said that the unsoundness should not be mentioned in the veterinarian's affidavit. The owner finally grew angry and took the stallion to another practitioner whose scruples, apparently, were not so pronounced. Shortly afterward the owner decided to have the stallion castrated. For this work he called the veterinarian who had refused to overlook the unsoundness, thus showing that for critical work he preferred a man who had shown himself to be square and honest.

The farmer has his limitations in treating his farm stock. There are many things he is able to do and doubtless in some he may well be encouraged by his veterinarian. The wide-awake stockman knows it is to his best interests to call a veterinarian. The better posted he is the fewer mistakes he is likely to make. He will not often call a veterinarian except when actually needed. He will not delay calling him in time of actual need. The country is becoming more and more filled with progressive farmers and progressive veterinarians. The reliance upon each other is a necessary feature of progress in stock breeding.

To succeed in a community the veterinarian must have, at least, a general education equal to the average of that community, higher than the average will be better, particularly if he is to take a commendable part in public affairs. In his professional capacity his knowledge must be much superior to that of his clients. The combined knowledge with the proper admixture of tact and diplomacy and last, but not least, unimpeachable integrity, spells success.

P. A. F.

INFORMATION RELATING TO APPOINTMENTS IN THE VETERINARY RESERVE CORPS OF THE ARMY

The National Defense Act of June 3, 1916, and the tentative regulations thereunder, provide for a veterinary section or branch of the Officers' Reserve Corps. The officers of the Veterinary Reserve Corps have the rank of second lieutenant, and are appointed and commissioned by the President, after having been found upon examination prescribed by him physically, mentally and morally qualified to hold such commissions. Commissions are issued for periods of five years, at the end of which time the officers may be recommissioned subject to such further examinations and qualifications as the President may prescribe. They are subject to call for duty in time of actual or threatened hostilities only. While on active duty under such call they are entitled to the pay and allowances (including quarters, fuel and light) of their grade. They are entitled also to pension for disability incurred in the line of duty and while in active service. They are not entitled to pay or allowances except when in active service, nor to retirement or retired pay.

Appointees must be citizens of the United States, between 22

and 55 years of age, must be graduates of recognized veterinary colleges or universities, and must, at the time of appointment, be in the active practice of their profession in the States in which they reside.

The examination is physical and professional. It is conducted by boards consisting in each case of one medical and two veterinary officers of the Army, designated by the War Department.

The examination as to physical qualifications conforms to the standard required of recruits for the United States Army. Defects of vision resulting from errors of refraction which are not excessive, and which may be entirely corrected by glasses, do not disqualify unless they are due to or are accompanied by organic disease. Minor physical deficiencies may be waived.

The professional examination will be oral. If the applicant fails therein, he may if he desires have a written examination. An average of 75 per cent is required to qualify in the examination. The examination comprises the following subjects: 1. General anatomy; 2. General pathology, therapeutics and surgery; 3. General bacteriology and parasitology; 4. Hygiene, including feeding and watering, stabling, heat and light, and ventilation.

Applications for appointment in the Veterinary Reserve Corps must be made in writing, upon the prescribed blank form, to the Surgeon General of the Army, Washington, D. C., who will supply the blank upon request. The correctness of the statements made in the application must be sworn to by the applicant before a notary public or other official authorized by law to administer oaths. It must be accompanied by testimonials based upon personal acquaintance, from at least two reputable persons, as to the applicant's citizenship, character, and habits, and by his personal history given in full upon the blank form furnished him for the purpose.

EUROPEAN CHRONICLES

Bois Jerome.

The Treatment of Cartilaginous Quittor.—Is there a surgical disease in veterinary medicine upon which as much or more has been written than cartilaginous quittor and its treatment? The severity of the ailment, the complications that may accompany it, the long time in which animals affected are disabled and the *many*

means that have been promoted, advocated, praised and then laid aside, have justified all the efforts to reduce to the minimum the consequences of its presence on the feet of all kinds of horses.

Could more be written on the subject? At first thought, one will answer in the negative; yet, in the *Revue Generale* of Panisset, of the 15th of January a veterinarian, attached to the Belgian army, Mr. J. Hamoir has published a very long article on the subject, where criticisms are made of the treatment and another is recommended as superior to all the others.

The treatment can be summarized, according to the writer, into two principal methods: in one, the object in view is the delimitation and elimination of the necrosed structure which is looked for in the use of the various potential caustics, the actual cautery, the cauterizing injections and principally the use of Villate Solution. In the other method, which is exclusively surgical, the object is the eradication of the necrosed tissues and more commonly the total removal of the diseased part.

The author considers the latter method first, viz: the operation for the removal of the lateral fibro-cartilage as known by all veterinarians, the removal is accomplished by four different methods. 1st. The wall of the quarter or the classical operation; 2nd. The wall and the coronary skin, method of Bayer, and Schroeder; 3rd. The plantar surface of the heel and sole, method of Chuchu; 4th. The coronary cutaneous covering, method of Perrier.

The description and modus operandi of these four methods are then considered by the author and illustrated. Each one is subjected to criticisms, which can be readily understood and have probably been observed by those who have resorted to these various processes. One is especially explicit and refers to the method which advocates a partial removal of the cartilage. *Never make a partial removal, but always perform the total operation.* Of course this applies only to the cases where the operation of ablation of the lateral fibro-cartilage is resorted to.

The sequelae of the operation of this first mode of treatment are considered. Regeneration of the fibro-cartilage, lameness following the cure from the quittor, pedal osteitis, etc.

After these considerations the author takes the method of caustics and escharotics in hand. He is brought to the presentation of a mode of treatment which he does not claim as his but has seen it applied and has resorted to it himself with what he considers great success.

In his own words, he says: "The technic of this treatment is this: no special education, no complications, no instrumentation is necessary; only a blunt pointed cautery and a glass syringe.

"A grooved director is introduced in the fistulae (single or many) so as to ascertain the direction and depth to which the actual cautery must be introduced. Red heated, this is pushed rapidly in, two or three times. The next and following days, with the syringe and a strong pressure, every cauterized orifice receives a full measure of Villate solution.

"The results of the injections are then described. First, the suppuration is more abundant, then it becomes mixed with pustulant, grey-yellowish casts, the disintegration of the necrosed tissues takes place. The pus diminishes gradually. After eight days the morbid secretion has ceased and it is very rarely that a second cauterization is required."

A résumé of the cases recorded in the article of the *Revue Generale* will tell of the value of the method, advocated by Mr. Hamoir, at least as far as the *average duration* is concerned.

The cases recorded are divided in three classes taking for a basis the prognosis of the cases.

1—*Benignant Cases*—Simple or incomplete fistula with lameness, slight or not severe:—14 cases—Recoveries in 3 weeks, 18 days, 20 days, 5 weeks, 16 days, 1 month, 13 days, 21 days, 46 days, 1 month, 22 days.

2—*Severe cases*—with complete or multiple fistulae, with or without lesions of the coronary band. Deformation of the coronary band—severe lameness. 12 cases recovered, in 26 days, 33 days, 20 days, 16 days, 12 days, 1 month, 8 days, 18 days, 25 days, 13 days, 23 days, 20 days.

3—*Complicated Cases*—Only two cartilaginous quittors following a suppurative corn, one in a neurotomized mare, destroyed because of extensive complications. The other quittor complication of canker, had to be finally operated by the classical method. It is the only subject which resisted actual cauterization and injections of the Villate solution.

I have tried as concisely as possible, to do justice to the article without taking more space than such analysis would permit and at the same time offer to our readers all that the article of Mr. Hamoir presented of interest. In concluding, however, I cannot but ask myself if there is entire originality in the *new* treatment advocated

and if I cannot recall years and years ago, at least very similar treatment performed and recorded in the United States. Perhaps some of our older readers may.

Report of the Chief of the Bureau of Animal Industry.—I have been favored with this official document which contains the activities of the Bureau for the year ending June 1916.

It is presented by Dr. Melvin and offers to the attentive observer in a concise manner the enormous amount of work done by this branch of the Department of Agriculture in the United States.

The first pages of the report relate to a few diseases that required the attention of the Bureau. Remarks are offered on the problem of foot-and-mouth disease finally eradicated after the slaughter of 172,222 animals, of an appraised value of nearly $5,000,000. Then of the progress against hog cholera where the application of serum has been extensively used. Then on the tuberculosis problem which demands "that the first steps should be taken to spread among the people concerned a knowledge of the facts as to the nature of tuberculosis, how it is spread and how it may be prevented"—and finally on hemorrhagic septicemia, which has been the object of special attention by the Pathological Division of the Bureau with Drs. Mohler and Eichhorn at the head of the division.

Following this, the report takes up the work of the various divisions of the Bureau.

That of *Animal Husbandry,* under the direction of Chief George M. Rommel, where are considered his numerous investigations relating to the species of domestic animals.

The *Dairy Division,* Dr. B. H. Rawl, in which the significant new features are the growth and interest in the manufacture of dairy products in the various states.

Meat Inspection has for its chief Dr. R. P. Steddam, whose functions will be readily appreciated.

The *Field Inspection Division* has Dr. B. A. Ramsay for director. Besides the work of eradicating foot-and-mouth disease carried on mostly through that division, it has also worked on the eradication of other plagues, that of southern cattle ticks, of sheep, cattle and horse scabies, etc.

The *Quarantine Division,* with Dr. R. W. Hickman at the head, has had much to do with the number of animals imported,

quarantined and tested with tuberculin. The eradication of dourine has also occupied the workers of that division.

In the *Pathological Division,* Dr. A. Eichhorn is found as the chief. The work done by that division is enormous. As indeed is shown by the many bulletins issued by the Bureau from its reports, on investigations on anthrax, cerebro-spinal meningitis or forage poisoning, dourine, glanders, hemorrhagic septicemia, infectious abortion, etc., etc. The list is too long to be referred to in such a short notice.

The *Biochemic Division,* with Dr. M. Dorset as chief, refers to research work on hog cholera, on the virus-serum-toxin, on the distribution of tuberculin and of mallein, etc.

In the *Zoological Division,* the chief, Dr. Ransom, has made reports on the work relating to roundworms of sheep, on the treatment and control of external and of internal parasites, of parasitic protozoa, etc., etc.

Under the heading of Miscellaneous Division Dr. A. M. Farrington, who is the chief, refers to the valuable changes in the veterinary colleges, in which the course of studies has been raised from 3 to 4 years' attendance.

Finally, the work of Dr. E. C. Schroeder, the superintendent of the *Experiment Stations,* is referred to in relation to infectious abortion in cattle and to tuberculosis. The conclusions relating to infectious abortion can be summarized from the principal facts discovered or proved to be true as follows:

"1. That infected cows often remain carriers of the bacillus of infectious abortion disease, long after they have ceased to manifest symptoms of their infected condition.

"2. That cows which have never aborted and regularly produced seemingly normal calves may be chronic carriers and disseminators of abortion bacilli.

"3. That the habitat of the abortion bacillus in the bodies of infected cows that are apparently healthy is the udder.

"4. That the infection in an infected herd may be limited to a single quarter, or may exist in two, three or all quarters.

"5. That both the milk and the blood serum of cows with infected udders invariably agglutinate suspensions of abortion bacilli.

"6. That colostrum from cows with infected udders has an enormously high agglutinating potency for abortion bacilli.

"7. That the agglutinating potency of the blood serum of a

pregnant cow is not a reliable measure of the probability of an abortion or a normal parturition.

"8. That careful tests made with blood, the heart, liver, kidneys, lungs, spleen, lymph glands from all portions of the body, nerve and brain tissues, muscles, uterus, ovaries, etc., from cows infected with abortion bacilli have failed to reveal the presence of the bacilli elsewhere than in the udder, supramammary lymph glands, rarely in some of the lymph glands of the pelvis and in the uterus only near the time of an abortion or at parturition.

"9. That the abortion bacillus is an organism which is amazingly resistant to natural germ-destroying agencies.

"The best known means of guarding against the ravages of this serious disease is the proper use of the agglutinating test, which is very reliable and not expensive. The test should be applied to every new animal purchased before it is permitted to come in contact with the uninfected herd. The chronic carriers of abortion bacilli which we have proved to be numerous must be regarded for the time being as the greatest menace against which the herd should be protected so far as this disease is concerned and the agglutination test has a high potency in detecting such chronic dissemination."

Tetanus Treatment.—I would not be surprised if after reading this title, some of our readers would exclaim: "*Why, again a new treatment!*" They would certainly be justified as it is of a new treatment, based on the modest claim of a contribution to the treatment of tetanus by Major Veterinary Rocher, that this extract is made.

It is well understood that practically everything relating to tetanus has been written concerning the disease in all its forms, its manifestations, its various assumptions, its positive diagnosis, its almost always certain, fatal prognosis and its treatment preventive and curative. Everything relating to it has been extensively considered and has found in scientific publications the publicity that the subject deserves.

And yet, the contribution of Mr. Rocher cannot be allowed to pass on merely the single acknowledgement of a case. Why? Because, though only a contribution, it has a value of its own; one that the daily practitioner can scarcely be justified in ignoring.

The reading of the case as described in the part of Pathology and Therapeutics of the *Recueil* of December 1916 will determine if I am overrating the said contribution.

A mare had a slight injury of the coronary band on the external face of the right fore foot. This wound was simple, was dressed with tincture of iodin, no preventive injection of antitetanic serum was made, cicatrization was normal in a few days. Thirteen days later the mare was laid up and on the following day a diagnosis of lock jaw was made without difficulty. All the symptoms were well characterized and the development was rapid. Notwithstanding the treatment of antitetanic serum injections and enemas of chloral repeated four times a day, the generalization was such and progress of the disease was so rapid that a fatal termination was looked for in a short time.

In the presence of this condition, on the fourth day of the disease, one gram of the aqueous solution of hydrobromide of cicutine, in five syringe doses of five c.c., or 20 centigrams in each, was injected into the mare.

On the next day some hope was entertained. The head was moved more easily, so were the jaws. The day following the improvement was still more marked, the mare took some food. On the fifth day from the beginning of the treatment the tetanus was in complete regression. The trismus had disappeared, the jaws moved freely and the mouth opened and closed without difficulty. Labial prehension was possible, the neck was free in its movements, and the legs had more suppleness.

The injections were stopped. Those of chloral only were kept up for a few days longer. The *Cicutine* treatment was started on the 3d day and stopped on the 7th day of June and on the 13th the animal was in full convalescence. It seems proper to conclude that the recovery had taken place in less than 10 days.

The action of the cicutine on the effects of the toxin of the bacillus has in this case been extremely marked, especially in taking into consideration the severe exacerbations of the symptoms.

The drug is deserving of further use.

Riziform Granular Cysts.—Do they always indicate a tubercular infection? That is the question which appears in a communication made before the Society of Comparative Pathology in Paris.

Known for a long time in man, where they have been the object of close investigation, these cysts are less common in animals or, at least says Mr. Bissauge, our literature is almost mute on the subject.

From the surgical point of view, these cysts have not a very great importance in veterinary medicine, their treatment is the same as that for other cysts.

In human medicine, riziform granular cysts of synovitis, of the digital sheath of the flexors or extensors of the palm of the hand, etc. are considered as tuberculous lesions, perhaps attenuated in form, very slow in resolution, and occurring in subjects generally strong and resistant.

Histology, experimentation and clinical observations have established the undeniable tuberculous nature of them.

In man, as in animals, these cysts have generally an elongated form, if they develop in tendinous cul-de-sacs or again some have peduncles which, in time, permits their separation from the synovial sac to which they belong.

In horses, when the cysts are not synovial, as those occurring by the repeated friction of harness or any spot on the skin, on the outside of joints, their form is spherical or more or less elongated.

Their characteristic lies in the nature of their contents; when punctured there escapes a thready, oily fluid, yellowish or slightly reddish, in which float a more or less abundant quantity of small grains varying in size, difficult to crush, with a smooth surface, or slightly flattened.

In some cases, the grains are collected in small masses, as big as a hazel nut and again in others they are perforated in the center resembling the beads of a chaplet.

In old cysts, the fluid has completely disappeared and the cavity is full of riziform granules.

The walls of the cysts are either smooth and polished or covered with fibroplastic elements in lamellae or bands.

In both human and veterinary medicine riziform granular cysts are absolutely identical: the external aspect, the contents, the walls are the same and similar treatment can be applied and followed by the same results.

But, the tuberculous origin, so well established in man, does not seem to be accepted for animals, at least in this day. Hence the question asked by the author, after recording a few doubtful

cases, where the presence of the cysts promoted successful surgical interference, without the possibility of ascertaining if the animals operated on had tuberculosis or not. They all made a radical recovery.

SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

ANNALES DE L'INSTITUT PASTEUR.—(X) Researches on the virulence of muscles and lymph glands, apparently healthy, in generalized tuberculosis of cattle and of swine. (X) On the post series tetanus.

REVUE DE PATHOLOGIE COMPAREE.—(O) Treatment of eczema in dogs. (X) Treatment of epizootic lymphangitis by autopyotherapy.

RECUEIL DE MÉDÉCINE VÉTÉRINAIRE.—(X) Vocal cord and ventricle of the glottis. (X) Urethro-cutaneous sutures in amputation of the penis in horses. (O) On sand colic. (O) Enormous coccygeal arterio-venous dilatation in a steer. (O) Mycotic pseudo-tuberculosis in a South American horse.

VETERINARY JOURNAL.—(X) Our 500th number. (O) Interesting case of uterine eversion and milk fever. (O) Interesting shrapnel injury. Bacterial necrosis in the horse. (O) Uterine eversion in a mare. (O) Punctured wound of the hock in a cart mare. (O) Pruritic dermatitis by infection of mange from cat.

VETERINARY RECORD.—Unusual accident. (O) Fracture of the pedal bone. (O) Rupture of the uterus in a cow. (O) Curious lameness implicating levator humeri. (O) Internal strangles.

VETERINARY NEWS.—Hospital observations on the mule. (O) Complications. Quittor. Clinical notes.

LA CLINICA VETERINARIA.—Studies on the hygienic production of milk. Some remarks on anthrax.

CORNELL VETERINARIAN.—Control of tuberculosis, abortion and calf scours in a large dairy herd. Reports on clean milk. Diagnosis of open cases of tuberculosis. Suppuration in cattle and swine by Bacterium pyogenes. Great nematode in the abdominal cavity.

A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

—It is reported that Dr. L. E. Northrup, as state veterinarian of Indiana, in an effort to increase live stock production, has offered his services as a distributing agent for farmers wishing to dispose of hogs weighing 100 pounds or less, to purchasers who will fatten them and that he will vaccinate all hogs for cholera and dip them to prevent other diseases.

HOG CHOLERA TRANSMISSION THROUGH INFECTED PORK*

R. R. Birch, Ithaca, N. Y.

There is no other acute infectious disease of animals which is so widespread as hog cholera. It occurs in almost, if not quite, all countries in which swine are raised, and in some countries there are few large areas entirely free from it. While it is most prevalent near the more important shipping routes and in localities where large numbers of hogs are raised, it nevertheless appears frequently on remote farms and in localities far removed from busy traffic routes and centers. Its appearance in these seemingly well isolated places has been puzzling, for it is well known that it is caused by a specific virus, and that whenever it appears in a herd, the virus has in some manner been transferred to the herd from other infected animals.

Hog cholera virus, while it is not known to multiply outside the bodies of swine, is very tenacious and resists most natural destructive influences for long periods of time. A very small quantity[1] of it will infect an animal, and it is, therefore, commonly supposed that such casual carriers as crows, buzzards, and also various domestic animals not themselves susceptible to hog cholera, are in a large measure responsible for the many seemingly mysterious appearances of the disease. While the facts at hand do not admit doubt concerning the possibility of hog cholera virus transmission by these carriers, there are good reasons to doubt whether they possess the degree of importance usually attributed to them. Circumstances seem to point to some important means of transmission less precarious than is furnished by such carriers.

Hogs that are fed garbage very frequently contract cholera and garbage often contains pork trimmings. Since garbage feeding is habitual both with farmers who feed only their own kitchen refuse and with men who make a business of removing and feeding city garbage, it seems reasonable to suppose that this practice may

* Presented at the Meeting of the A.V.M.A. Section on Sanitary Science and Police, August 1916, Detroit, Mich.

1. King places the minimum fatal dose of hog cholera virus for a 50 lb. pig somewhere between 1/215 and 1/300 c.c. In his experiments the doses were administered intramuscularly.

be responsible for many new herd infections. Further evidence supporting this belief is found in the facts that marketing the seemingly well animals in newly infected herds is a common practice, and that hog cholera virus appears in the blood stream of infected animals quite early in the course of the disease.

In the past, very little importance seems to have been attached to the transmission of hog cholera through infected bits of pork. Dr. James Law[2] mentions pork trimmings as a possible source of infection, but he lays special stress on dangers incident to feeding slaughter house refuse. Hutyra and Marek[3] make no mention of market pork as a possible means of hog cholera transmission, and neither do Friedburger and Fröhner[4]. Dr. M. Dorset[5] in summarizing the various channels of inter-herd spread of the disease makes no mention of infected pork trimmings. So far as we know the first outbreak traced with any degree of accuracy to infected market pork was one in Canada which McGilvray[6] reported in 1912. Even that outbreak seems to have been regarded as an exception for very little has been done looking toward the prevention of this means of hog cholera transmission.

Anti-hog cholera serum has removed one of the greatest obstacles in the way of hog cholera control. Not only does it protect herds in which the disease is just starting and prevent its appearance in other threatened herds, but it prevents, or should prevent, these herds from being shipped to market at times when they are in condition to infect other swine. It thus removes an almost unbearable hardship to swine breeders that otherwise would accompany the enforcement of strict sanitary measures to prevent shipping cholera infected hogs. It has given good reasons to hope for the more complete control or eradication of hog cholera, and in so doing it has centered the efforts of a large number of veterinarians on a more thorough study of the disease itself, and on sanitary measures for its control. Since it cannot be effectively controlled as long as any one common means of transmission remains unknown or unheeded it has seemed desirable to procure exact experimental data on the effects of feeding susceptible pigs bits ot pork such as might be found in garbage.

The experiments have been conducted with three kinds of pork; fresh, refrigerated, and cured. Some of the specimens of each kind were taken from carcasses that would have passed inspection, and others were taken from carcasses that would have

been condemned. In all the experiments, before the specimens were removed for feeding, the hams were scalded and scraped as is done in butchering. Except as otherwise stated the material fed consisted of all or a part of the head of a femur together with adjacent parts. With one exception, experiment No. 1 in table No. 2, the hams all came from small shoats weighing less than one hundred pounds each, a fact which might have considerable influence on results obtained from feeding cured pork. Large hams would naturally be expected to harbor virus in their depths with somewhat greater regularity than small ones when both are subjected to killing influences that work from without.

The susceptible pigs to which the pork trimmings were fed were isolated with great care. In the earlier experiments small fly-tight pens were constructed of screen and matched lumber for this purpose. These were located on a hill several hundred feet from hog yards of any kind. When infection occurred in a pen it was immediately burned, and a new one was constructed on fresh soil for further experiments. The pigs fed in later experiments were placed in small individual fire brick pens so constructed that the attendant could not touch the pigs within. Food and water were introduced through a joint of tile. After each experiment the pen used was cleaned out and a wood fire was kindled inside and allowed to burn for several hours. Thus, in all cases heat, rather than disinfectants, was used to destroy the virus. Most of the pigs were isolated a week or more before being fed and in no case did disease appear previous to feeding. In all cases the experimental pigs were selected from a herd of susceptible animals, and, except as noted, disease did not appear in this herd subsequent to the time the animals were removed. These two facts practically exclude the possibility that any of the experimental animals were infected prior to the time at which they were isolated.

In judging the part played by meat inspection in removing cholera infected carcasses from the market, the federal meat inspection regulations have been selected as a standard, because most of the meat inspected in this country is inspected by federal employees or by others who follow the federal regulations quite closely. Following are the paragraphs that govern antemortem and postmortem inspection in their relation to hog cholera:

Regulation 9, section 2, paragraph 2. "All hogs plainly showing on ante-mortem inspection that they are affected with either hog cholera or swine plague shall be marked 'U. S. condemned' and disposed of in accordance with section 8 of this regulation."

Regulation 9, section 2, paragraph 3. "If a hog has a temperature of 106°F. or higher and is of a lot in which there are symptoms of either hog cholera or swine plague, in case of doubt as to the cause of the high temperature, after being marked for identification, it may be held for a reasonable time under the supervision of an inspector, for further observation and taking of temperature. Any hog so held shall be reinspected on the day it is slaughtered. If upon such reinspection, or, when not held for further observation and taking of temperature, then on the original inspection, the hog has a temperature of 106°F. or higher it shall be condemned and disposed of in accordance with section 8 of this regulation."

Regulation 9, section 2, paragraph 6. "All animals which, on ante-mortem inspection, do not plainly show, but are suspected of being affected with, any disease or condition that, under these regulations, may cause condemnation, in whole or in part, on post-mortem inspection, shall be so marked as to retain their identity as suspects until final post-mortem inspection, when the carcasses shall be marked and disposed of as provided elsewhere in these regulations, or until disposed of in accordance with section 7 of this regulation."

Regulation 9, section 4, paragraph 1. "All hogs, even though not themselves marked as suspects, which are of lots one or more of which have been condemned or marked as suspects under section 2 of this regulation for either hog cholera or swine plague, shall, so far as possible be slaughtered separately and apart from all other animals passed on ante-mortem inspection."

Post-mortem inspection.

Regulation 11, section 4, paragraph 1. "The carcasses of all hogs marked as suspects on ante-mortem inspection shall be given careful post-mortem inspection, and if it appears that they are affected with either acute hog cholera or swine plague, they shall be condemned."

Regulation 11, section 4, paragraph 2. "Carcasses of hogs which show acute and characteristic lesions of either hog cholera or swine plague in any organ or tissue, other than the kidneys or lymph glands, shall be condemned. Inasmuch as lesions resembling lesions of hog cholera or swine plague occur in the kidneys and lymph glands of hogs not affected with hog cholera or swine plague, carcasses of hogs in the kidneys or lymph glands of which appear any lesions resembling lesions of hog cholera or swine plague shall be carefully further inspected for corroborative lesions. On such further inspection—

"(a) If the carcass shows such lesions in the kidneys, or in the lymph glands or both, accompanied by characteristic lesions in some other organ or tissue, then all lesions shall be regarded as those of hog cholera or swine plague, and the carcass shall be condemned.

"(b) If the carcass shows in any organ or tissue, other than the kidneys or lymph glands, lesions of either hog cholera or swine plague which are slight and limited in extent, it shall be passed for sterilization in accordance with regulation 15.

"(c) If the carcass shows no indication of either hog cholera or swine plague in any organ or tissue other than the kidneys or lymph glands, it shall be passed for food, unless some other provision of these regulations requires a different disposal."

Most of the virus used in the experiments was the same as was used in our routine work of serum production. It was of an exceedingly virulent strain obtained originally from Dr. W. B. Niles of Ames, Iowa. Pigs inoculated with 2 c.c. of this virus were usually ready to kill for virulent blood in seven days. In the remainder of the experiments the virus used was obtained from Dr. A. D. Fitzgerald, Columbus, Ohio. This also was of a highly virulent strain.

The method of securing carcasses that would pass inspection was to inject small shoats with 2 c.c. each of virulent blood and record temperatures every twenty-four hours subsequent to injections. When a decided elevation was recorded the pig was killed and autopsied; then the ham was removed and scalded and a specimen secured for feeding. In each case the virus was injected into the right ham and the specimen fed was secured from the left ham. Complete data concerning these animals appears in table No. 1. Relative to the interpretation of results it should be stated that, except as noted, all the lesions produced were of the acute form of hog cholera, and all the animals that sickened displayed symptoms similar to those produced by that disease. The term "typical lesions of cholera" as used in all the tables indicates that the animals in reference revealed on autopsy petechiae in the kidneys, and in addition characteristic hemorrhages (petechiae and ecchymoses) in one or more other organs.

The animals that became infected were killed when severe symptoms developed in order that their blood might be used to hyper-immunize hogs in the routine of serum preparation.

TABLE NO. 1.

Showing temperatures, symptoms, and lesions[1] of pigs from which the specimens fed were taken. (Tables 2, Section b; 3, section b; 4, section b.)

No. of Pig	Date injected	Date killed	Temperature when killed	Symptoms noted	Lesions found	No. of expt in which specimen was fed
106	Jan. 20	Jan. 23	106.2°[2]	None	None	Expt. No. 6 Table 2, Sec. b.
107	Feb. 20	Feb. 23	105.4°	None	Mucosa of bladder**	Expt. No. 7 Table 2, Sec. b.
108	Mar. 30	Apr. 2	105.6°	None	Right inguinal lymph gland** Right sublumbar lymph gland** Left sublumbar and cardiac lymph glands*	Expt. No. 8 Table 2, Sec. b.
109	Feb. 2	Feb. 6	105.6°	None	None	Expt. No. 9 Table 2, Sec. b.
110	April 15	Apr. 18	Below 106.0°	None	None	Expt. No. 10 Table 2, Sec. b.
111	Oct. 21	Oct. 25	105.7°	None	None	Expt. No. 11 Table 2, Sec. b.
112	Jan. 26	Jan. 30	105.2°	None	None	Expt. No. 12 Table 2, Sec. b.
113	Jan. 26	Jan. 31	104.3°	None	None	Expt. No. 13 Table 2, Sec. b.
126	Jan. 22	Jan. 26	104.6°	None	None	Expt. No. 26 Table 3, Sec. b.
127	Jan. 22	Jan. 26	105.2°	Slight dullness	Three or four mesenteric lymph glands	Expt. No. 27 Table 3, Sec. b.
152	Nov. 20	Nov. 24	105.1°	None	Gastro-Hepatic lymph glands*	Expt. No. 53 Table 3, Sec. b.
153	Nov. 20	Nov. 25	105.0°	None	None	Expt. No. 54 Table 3, Sec. b.

1. *—congestion. **—slight hemorrhage. ***—marked hemorrhage.
2. Would not have passed inspection had its temperature been taken ante-mortem.

TABLE No. 2.

Showing results of feeding fresh pork to susceptible pigs.
Section a. Pork from carcasses that would not pass inspection.

No. of Expt.	Source of infected material	Quantity fed	Pig No.	Date of Feeding	Symptoms Appeared	Date of Death	Remarks
1	Rind and fat from shoulder	4 lbs.	1–2	July 26-30	No symptoms	——	Pigs later proved susceptible.
2	Flesh and bone	3 lbs.	3–4	Oct. 9	Oct. 15	Oct. 20	Pigs killed when very weak. Typical lesions of cholera in both.
3	Flesh and bone	3 lbs.	5–6	Oct. 20	Oct. 28	Nov. 3	Pigs killed when very weak. Typical lesions of cholera in both.
4	Flesh and bone	2 oz.	7–8	Oct. 28	Nov. 8	Nov. 13	Pigs killed when very weak. Typical lesions of cholera in both.
5	Flesh and bone	1 oz.	9–10	Jan. 7	Jan. 12	Jan. 15	Pigs killed when very weak. Typical lesions of cholera in both.

Section b. Pork from carcasses that would pass inspection.

No. of Expt.	Source of infected material	Quantity fed	Pig No.	Date of Feeding	Symptoms Appeared	Date of Death	Remarks
6	Flesh & bone from pig 106 (table 1)	2 oz.	11–12	Feb. 23	Feb. 28	No. 11 Mar. 4	No. 11 showed typical lesions of cholera. No. 12 developed chronic cholera and recovered.
7	Flesh & bone from pig 107 (table 1)	1½ oz.	13–14	Jan. 24	Jan. 29	Jan. 31	Both pigs killed when very weak. Typical cholera lesions in both.
8	Flesh & bone from pig 108 (table 1)	2 oz.	15	Apr. 6	Apr. 11	Apr. 14	Pigs killed when very weak. Typical lesions of cholera in both.
9	Flesh & bone from pig 109 (table 1)	1 oz.	15	Feb. 8	Feb. 13	Feb. 15	Pigs killed when very weak. Typical lesions of cholera in both.
10	Flesh & bone from pig 110 (table 1)	2 oz.	17	Apr. 18	Apr. 22	Apr. 26	Pigs killed when very weak. Typical lesions of cholera in both.
11	Flesh & bone from pig 111 (table 1)	½ oz.	18	Oct. 27	Nov. 2	Nov. 4	Pigs killed when very weak. Typical lesions of cholera in both.
12	Flesh & bone from pig 112 (table 1)	½ oz.	19	Feb. 1	Feb. 7	Feb. 12	Pigs killed when very weak. Typical lesions of cholera in both.
13	Flesh & bone from pig 113 (table 1)	½ oz.	20	Feb. 1	Feb. 7	Feb. 12	Pigs killed when very weak. Typical lesions of cholera in both.

Remarks on table No. 2, Section a. Experiment No. 1 was conducted in very hot weather. The material fed consisted of rind and subjacent fat. Portions were fed during a period of six days, and, especially in the later feedings, a decidedly rancid odor was present. It is possible that decomposition had something to do with the failure of such large quantities to produce infection. The principal point to be noted is that most of the specimens fed produced hog cholera infection.

Remarks on table No. 2, Section b. The experiments recorded in this table were conducted to determine with what regularity fresh specimens from hogs killed while in the early stages of hog cholera, and the carcasses of which would pass inspection, would produce hog cholera when fed to susceptible pigs. Of the eight specimens fed, all produced the disease.

Remarks on table No. 3, Section a. In this table, the meat referred to as frozen was hung in a rather open garret in an unheated building from the time the animals were killed until samples of their flesh were fed. The weather was such that the hams were frozen most of the time but in some cases there were perhaps a few days during which they thawed to some extent. The meat referred to as chilled was placed in an ordinary refrigerator during the time mentioned.

It is very probable that experiment No. 17 would have proved negative had it been possible to obtain a subsequent check on the susceptibility of the pig fed. Litter mates of this animal were susceptible. Under the circumstances though the experiment was classed among those showing undetermined results.

Experiments number twenty and twenty-two show interesting results. In Experiment No. 20 no visible symptoms appeared and no temperatures were taken. The pig subsequently proved to be immune in spite of the fact that it was a litter mate of seven others all of which were highly susceptible. Thus there is very little doubt that the animal was immunized by the material fed to it. Whether the immunizing effect was due to attenuation of the virus or to the small quantity of virus in the specimen is, of course, unknown. In Experiment No. 22 the pig fed showed moderate symptoms but recovered. At one time a temperature of 106° F. was recorded. There is little doubt that it also was immunized in the same manner. Further, it is highly probable that had it been one of a herd of susceptible pigs others would have been infected by associating with it.

TABLE No. 3.

(Showing results of feeding refrigerated pork)

Section a. Pork from carcasses that would not have passed inspection.

No. of Expt.	Source of infected material	Quantity fed	Pig No.	Date of feeding	Symptoms appeared	Death occurred	Remarks
14	Head of femur and flesh. Frozen 20 days	2 oz.	21–22	Feb. 4	No. 21 Feb. 9	No. 21, Feb. 12 No. 22, Feb. 28	No. 21 killed when very weak. No. 22 probably infected from 21. Both showed cholera lesions.
15	Head of femur of ham. frozen 95 days	2 oz.	23	Apr. 6	Apr. 11	Apr. 14	Killed when very weak. Typical cholera lesions.
16	Head of femur and flesh from ham frozen 62 days. No. 395.	2 oz.	24	Mar. 25	Mar. 31	Apr. 5	Typical cholera lesions.
17	Flesh and bone from virus of pig. No. 396. Frozen 62 days.	2 oz.	25	Mar. 25	No symptoms		Pig found April 5 with prolapsed rectum and was killed. Susceptibility not checked.
18	Flesh and bone from virus pig No. 397. Frozen 62 days.	2 oz	26	Mar. 25	No symptoms	No death	Pig later proved susceptible.
19	Flesh and bone from virus pig No. 398. Frozen 62 days.	2 oz.	27	Mar. 25	Apr. 2	Apr. 5	Lesions of cholera.
20	Flesh and bone from virus pig No. 399.	2 oz.	28	Mar. 25	No symptoms		Pig given 3 c.c. of virus but proved to be immune.
21	Flesh and bone from ham No. 423. Chilled 8 days.	½ oz.	29	May 6	May 11	May 15	No lesions of cholera. Blood proved infectious.
22	Flesh and bone from irus pig No. 424. Chilled 8 days.	*	30	May 6	May 12	Did not die	Pig developed symptoms but recovered. Later proved immune.

TABLE No. 3—(Continued)

No. of Expt.	Source of infected material	Quantity fed	Pig No.	Date of feeding	Symptoms appeared	Death occurred	Remarks
23	Flesh and bone from virus pig No. 425. Chilled 17 days	½ oz.	31	June 11	June 15	June 18	Pig killed when very weak. Lesions of cholera.
24	Flesh and bone from virus pig No. 430. Chilled 12 days.	½ oz.	32	Aug 3	Aug. 9	Aug. 11	Pig killed when very weak. Typical cholera lesions.
25	Flesh and bone from virus pig No. 431. Chilled 12 days.	½ oz.	33	Aug 3	Aug. 8	Aug. 11	Pig killed when very weak. Typical lesions of cholera.
	Section b. Pork from carcasses that would have passed inspection.						
26	Flesh and bone from pig No. 126 (table 1). Frozen 58 days.	2 oz.	34	Mar. 25	Mar. 31	Apr. 7	Lesions of cholera.
27	Flesh and bone from pig No. 27. (table 1). Frozen 58 days.	1 oz.	35	Mar. 25	Apr. 2	Apr. 7	Lesions of cholera.

*Specimen not weighed. Small button of bone equal in diameter toa nickel but three times as thick.

In Experiment No. 21 the pig fed developed severe symptoms and was killed in order that its blood might be used for virus. A careful autopsy revealed no lesions whatever so 2 c.c. of its blood were injected into a second pig. This pig developed symptoms of hog cholera and showed on autopsy extensive hog cholera lesions so the experiment was classed among those producing positive results. The original pig fed was simply one of those cases, by no means uncommon, in which the disease actually exists but in which its presence cannot be verified by autopsy.

Remarks on table 4. The cured hams from which the specimens were taken were prepared by a process known as sugar curing. They remained in the brine approximately five weeks, and after being removed were smoked from seven to ten days in green hickory smoke. The brine was prepared according to the following formula:

Common Salt	8 pounds
Brown sugar	2 pounds
Saltpetre	2 ounces
Baking soda	½ ounce
Water	4 gallons

Dissolve all the ingredients in the water. Boil slowly for an hour and skim. Allow to cool before using.

This has been selected as a representative formula for sugar curing. There are, of course, many formulae in use for this purpose but it is not likely that there is much difference in them as far as their effects on hog cholera virus is concerned. The only substances the use of which the federal regulations permit in preserving meats are salt, sugar, various vinegars, pure spices, saltpeter and sodium nitrate. Benzoate of soda may also be used but its presence must be declared on the label, and it cannot in accordance with the pure food law exist in finished food products in excess of 3-10%.

In sugar curing, vinegars are not used and benzoate of soda is used little if at all. Thus the only substances that might be used which do not appear in the above formula are sodium nitrate and pure spices. The former ingredient may be used to some extent in sugar curing processes, and of the spices, black pepper is quite frequently used. It is not likely though that sodium nitrate exerts more detrimental effects on virus than the corresponding potassium salt, and in the quantities in which they are used in

TABLE NO. 4.

Showing results of feeding cured pork.
Section a. Pork from carcasses that would not have passed inspection.

No. of Expt.	Source of infected material	Quantity given	Pig fed	Date of feeding	Symptoms appeared	Death occurred	Remarks
28	Subcutem injections of washings from bone. Ham 307.	6 c.c. each	36–37	Feb. 28	Mar 7	No. 36, Mar. 13 No. 27, Mar. 23	Both showed typical cholera lesions.
29	Rind from ham 307	4 oz.	38	Feb. 28	No symptoms	No death	Pigs later proved susceptible.
30	Head of femur and flesh from ham 307	2 oz.	39a–39b	Feb. 28	Mar. 4		39a showed lesions resembling cholera. 39b showed lesions of cholera.
31	Subcutem injections of bone marrow washings from ham 308.	10 c.c.	40	May 18	May 24	39a, Mar. 6 39b, Mar. 10	Animal killed when weak. Typical cholera lesions.
32	Material from ham 308.	2 oz.	40	May 18	May 23	Mar. 28	Animal killed when weak. Typical cholera lesions.
33	Meat and bone from ham 323.			July 15	July 18	No death	Cholera discovered in herd from which pig was taken. Experiment valueless.
34	Rind from ham 323	½ lb.	44 .	July 15	July 20	No death	Cholera of a subacute type discovered in herd from which pig was taken.
35	Injections from bone marrow washings. Ham 323.	20 c.c.	46–47	July 15	———	———	No symptoms appeared. Animal later proved immune. Cholera discovered in herd from which pig was taken.
36	Injection of bone marrow washings. Ham 324b.	10 c.c.	48–49	Sept. 30	No symptoms	No symptoms	Pigs later proved susceptible.
37	Rind from ham 324	½ lb.	50–51	Sept. 30	No symptoms	No symptoms	Pigs later proved susceptible.
38	Injection from bone marrow washings 323b.	5 c.c.	52–53	Oct. 6	No symptoms	No symptoms	Pigs later proved susceptible.
39	Material from ham 323b.	4 oz	54–55	Oct. 6	No symptoms	No symptoms	Pigs later proved susceptible.

TABLE No. 4—(CONTINUED).

No. of Expt.	Source of infected material	Quantity given	Pig fed	Date of feedng	Symptoms Appeared	Death occurred	Remarks
40	Rind from ham 323b.	½ lb.	56–57	Oct. 6	No symptoms	No symptoms	Pigs later proved susceptible.
41	Meat and bone from ham 378.	2 oz.	58	Feb. 6	Feb. 11	Feb. 15	Pigs killed when weak. Typical cholera lesions.
42	Meat and bone from ham 378b.	2 oz.	59	Feb. 24	Mar. 1	Mar. 5	Pig killed when very weak. Typical cholera lesions.
43	Meat and bone from ham 379.	2 oz.	60	Feb. 24	Mar. 5	Mar. 5	Pig killed when very weak. Typical cholera lesions.
44	Meat and bone from ham 379b.	2 oz.	61	Feb. 24	Mar. 1	Mar. 5	Pig killed when very weak. Typical cholera lesions.
45	Meat and bone from virus pig 413.	½ oz.	62–63	July 27	———	———	Pigs later proved susceptible.
46	Meat and bone from virus pig 414.	½ oz.	64–65	June 27	———	———	Pigs later proved susceptible.
47	Meat and bone from virus pig 415.	½ oz.	66–67	June 27	———	———	Pigs later proved susceptible.
48	Meat and bone from virus pig 440.	1 oz.	68	Oct. 18	———	———	Pigs later proved susceptible.
49	Meat and bone from virus pig 441.	1 oz	69	Oct. 18	———	———	Pigs later proved susceptible.
50	Meat and bone from virus pig 442.	1 oz.	71	Oct. 18	———	———	Pig later proved susceptible.
51	Meat and bone from virus pig 515.	1 oz.	71	Mar. 16	Mar. 22	Mar. 28	Typical cholera lesions.
				Section b.			
52	Material from pig No. 152, Table No. 1.	½ oz	72	Feb. 16	———	———	Pigs later proved susceptible.
53	Material from pig No. 153, Table No. 1.	½ oz.	73	Feb. 16	Feb. 23	Feb. 28	Pig killed when very weak. Typical cholera lesions.

sugar curing it is doubtful if any of the spices operate to kill hog cholera virus.

The outstanding fact brought out in table number four is that the virus of hog cholera in pork is frequently but not always killed during the process of sugar curing. Just what makes the difference between those cases in which it is killed and those in which it is not killed? The three controllable factors involved in the destruction of viruses by chemicals are the kind of chemical used, its dilution, and the time during which it acts. Can any of these influences be so modified that they will destroy the virus in all cases? This is a question that still remains to be answered.

As circumstances now appear there seem to be no chemicals that could well be substituted for salt and sugar as preservatives. The strength of the brine might be increased but there is a limit to an increase that would still leave the meat palatable. Increasing the time during which pork is in cure or increasing the time during which it is in the store house after being cured may offer possibilities. The fact that the virus was killed in so many of the specimens might seem to indicate that the time limit during which it can survive the sugar curing process was being approached. As a matter of fact, however, there seems to be no definite relation between the time which the hams were in the store room and the certainty with which specimens from them would prove infectious. All the hams were in cure approximately six weeks. The time during which different ones were in the store room varied from two to eighty-four days. Specimens from the hams representing these two extremes did not prove infectious. On the other hand specimens from two hams in the store room fifty-seven and eighty days respectively were found to contain living hog cholera virus. It thus appears that if time is to be employed as a factor in destroying hog cholera virus in sugar cured pork, store room cost and interest on money invested must be considerations.

It will be observed that although rind was fed in large quantities in individual cases, no infection was caused by it. It was fed in only three experiments though, and so few negative results cannot have much significance. In one instance, ham No. 307, feeding the rind did not produce infection and flesh and bone and also bone marrow washings from the same ham produced hog cholera. In this one instance the virus was evidently killed in the rind when it survived in the deeper parts. Since rind is very

likely to find its way into garbage it is a matter of interest and importance to determine how frequently it carries hog cholera virus, and it is to be regretted that during the time these experiments were in progress scarcity of susceptible pigs prevented determinations of this kind. They are not, though, essential. The real problem is not to determine whether there are parts of a ham that do not contain hog cholera virus; it is rather to determine whether there are parts that do contain it. Bone and bits of clinging flesh are frequently placed in garbage and danger is always present in case they contain virus. It is simply present in a greater degree in case it is found that rind also produces infection.

Besides hams, the parts most frequently sugar cured are shoulders and bacon. There are no good reasons to doubt that shoulders carry hog cholera virus in about the same proportion of cases that hams carry it. It seems quite probable that cured bacon, because of its thinness and because of the relative lack of vascularity of its parts, is less likely to contain virus than are hams and shoulders. This is a point that must be determined with certainty before carcasses showing slight lesions only can be disposed of in the most economical manner.

Viewing the entire situation from the standpoint of biology a very interesting group of co-related facts is encountered. If the filterable virus were possessed of human intelligence it could scarcely devise a more insidious and ingenious method of self preservation. It is known to multiply only in the bodies of swine and conditions favorable for its growth are therefore much restricted. Nevertheless, the difficulties met are overcome in a remarkable manner. The virus exists in the blood stream of the animals it infects and is thus distributed to all parts of the body; it cannot at any time be detected with the microscope; it is present in carcasses before gross examinations will detect it; it does not infect human beings and thus escapes radical measures that would otherwise be taken for its destruction; its presence in herds often drives them to market; it secretes itself in pork where putrefaction, its most deadly natural enemy, is prevented or delayed by curing and low temperatures; then as a final link in a remarkable chain, the virus, in placing itself where possibilities for its distribution are practically limitless is at the same time placing itself in material which as a common practice is fed to hogs.

TABLE NO. 5.

Summary.

Kind of pork	Total No. of Expts.	Number positive	Number negative	Number undetermined	Per cent* negative	Per cent positive	Remarks
Fresh carcasses that would have been condemned.	5	4	1	—	80	20	
Fresh carcasses that would have passed inspection.	8	8	—	—	100	—	
Refrigerated carcasses that would have been condemned.	12	8	1	3	88.8	11.2	
Refrigerated carcasses that would have passed inspection.	2	2	—	—	100	—	Small No. of experiments. Percentage not significant.
Cured carcasses that would have been condemned.	24	9	12	3	43	57	
Cured carcasses that would have passed inspection.	2	1	1	—	50	50	Small No. of experiments. Percentage not significant.

*In figuring percentages undetermined results are not considered.

In general, the results shown in table No. 2, Section b, should constantly be thought of in connection with those obtained in tables No. 3, Section a, and 4, Section a. The experiments recorded in table No. 2, Section b, were conducted to determine whether hog cholera virus in sufficient quantities to infect swine is contained in hams taken from hogs killed while in the early stages of the disease. The experiments recorded in tables No. 3, (Section a) and 4, (Section a) were conducted to determine the effects of refrigeration and sugar curing on the life of hog cholera virus contained in hams. It seemed desirable in conducting the latter experiments to use hams from pigs known to be infected; otherwise it would not have been known whether negative results were due to absence of virus in the hams before they were treated, or to the fact that the virus was killed during the processes of refrigeration and sugar curing.

The experiments established two important facts; first, hog cholera virus in sufficient quantities to infect swine is quite constantly contained in fresh hams taken from hogs killed before symptoms, (other than rise in temperature) appear, and before lesions form; second, when specimens were taken from pigs showing lesions, 43% of the cured ones and 88% of the refrigerated ones proved infectious.

Providing all originally contain virus in quantities sufficient to kill, there can, as far as we can see, be no conceivable difference between hams taken from pigs showing lesions and those taken from pigs that do not show lesions, as far as the effects of curing and refrigeration on the virus contained in them is concerned. However, in order to remove doubt concerning this point, experiments were conducted with two cured hams (table No. 4, Section b) and two refrigerated hams (table No. 3, Section b) taken from pigs showing no symptoms other than elevation of temperature and no lesions. One of the cured specimens and both of the refrigerated ones produced infection. It therefore seems likely that had the hams referred to in table No. 2, Section b, been subjected to curing or refrigerating processes, the results would have been similar to those obtained from feeding specimens from virus pigs showing lesions.

When the results of the experiments just described are examined in their relation to practices observed in marketing, slaughtering, and inspecting swine, there are several phases of the situation that deserve consideration.

Relative to marketing we are at once brought face to face with the fact that 40% of the pork consumed and 15% of that which is marketed in the country is not inspected. This is killed on farms, by local butchers, and by packing establishments that do not supply an inter-state trade. It is a well known fact that many herds are marketed as soon as hog cholera infection is discovered in them, and in places where there is no inspection practically all hogs that appear well on foot are killed and sold for food. It is needless to add that large numbers of virus carrying carcasses must be included among those that reach our markets from these sources. Circumstances thus point to a need for extension of both local and federal inspection.

Turning now to the pork inspected under federal regulations let us examine the regulations themselves with a view to determining how they operate to eliminate from the market carcasses that contain hog cholera virus. First, though, it should be stated that the federal regulations compare favorably with those in force in other countries. The efficiency and thoroughness with which they fulfill their lawful purpose—the protection of human health and human life—is not questioned, but if they do not at the same time operate to protect the swine industry of the country, this fact and the reasons for it should be known, the situation should be looked squarely in the face, and a remedy for it should be sought.

Under existing conditions a consignment of cholera infected hogs reaches market and is first subjected to ante-mortem inspection. With respect to hog cholera, it may contain five classes of hogs: first, dead hogs; these are condemned and tanked; second, hogs that show undoubted symptoms of cholera; these are also condemned and tanked; third, hogs that show suspicious symptoms and temperatures below 106°F.; these are slaughtered; carcasses that show lesions of hog cholera are condemned or passed for sterilization according to the extent of the lesions; those that show no lesions are passed for food; fourth, apparently normal hogs (and those showing suspicious symptoms) that have temperatures above 106; these are condemned or isolated for further temperature records; in case further temperatures are taken the animals are condemned if their temperatures are still above 106°; otherwise they fall into class three or class five; fifth, apparently normal hogs that show temperatures below 106°F.; these pass ante-mortem inspection and post-mortem as well if they do not show

lesions of hog cholera in organs other than the kidneys or lymph glands.

Briefly stated, the requirements in order that a given hog may pass inspection are that it shall not show undoubted symptoms of hog cholera, it shall not show suspicious symptoms plus any hog cholera lesions, it shall not show a temperature above 106°F., and regardless of ante-mortem findings the carcass shall not on post-mortem show hog cholera lesions in organs *other than the kidneys or lymph glands.* What are the chances for virus carrying carcasses to pass inspection? A consideration of symptoms, temperatures, and lesions in their relation to the time at which the flesh becomes infectious, will throw some light on this point.

Relative to symptoms, it need only be stated that a hog will usually show elevation of temperature from one to three days before any marked symptoms of hog cholera appear. The excitement to which hogs are subjected in shipping probably lengthens this time to some extent, because under such circumstances, a slight dullness and sometimes even graver symptoms cannot even by the closest scrutiny be detected.

The temperature record, especially when the dividing point is placed as high as 106°F., offers a very uncertain standard upon which to separate infected animals from sound ones, but it constitutes a most valuable adjunct to other factors employed for the purpose. In the first place there is a wide variation in the normal temperatures of swine—from 101°F. to 104°F. In the second place weather conditions, excitement due to shipping, and other factors that cannot be controlled alter otherwise normal temperatures very materially. It is very probable that most of these influences when they affect temperatures noticeably, operate to elevate rather than to lower them, and this probably is the reason why the dividing point—106°F.—has been placed so high. It is certain that some hogs may carry temperatures near 106° as a result of excitement or exertion, and it is equally as certain that many others carry temperatures below 106° when they are suffering with hog cholera.

Another important thing to recognize is the *usual* hog cholera curve. It rises quite rapidly as a rule, remains high for a few days, and then takes a decided drop, which, if death does not ensue, is followed by a second elevation. The following, reproduced from Hutyra and Marek is intended to show a typical hog cholera

curve. It appears originally in the centigrade scale, but it has for the sake of convenience been changed to Fahrenheit.

The temperature curves we record in young pigs usually rise above 106° for a short time, and as a rule they do not fall quite as low between the first and second elevations as did the above curve (Jan. 21). In other ways the curves we record correspond quite

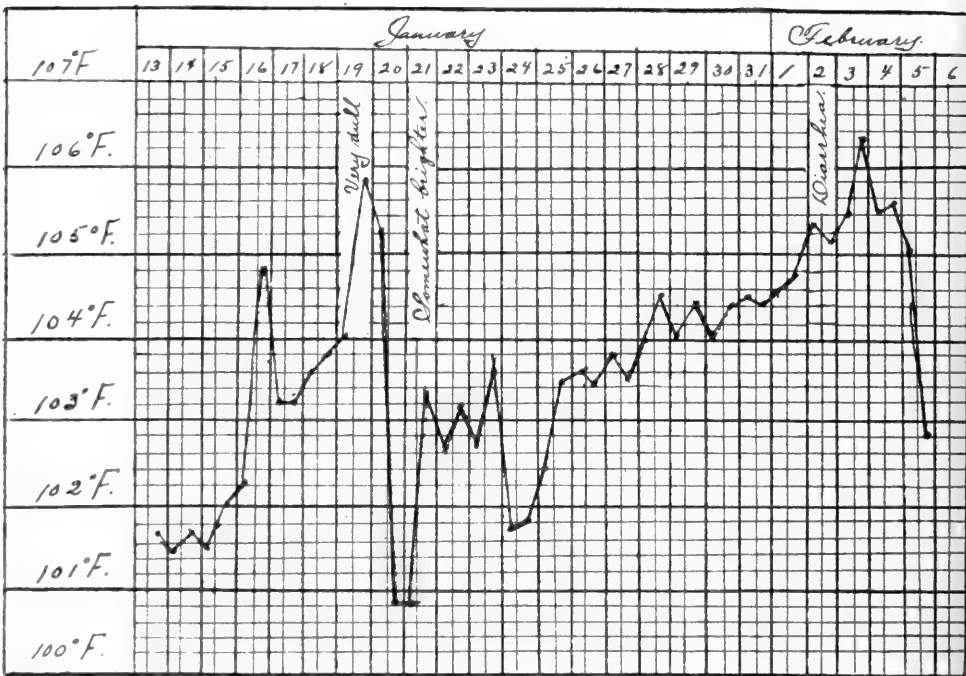


Fig. 1. Hog cholera. Artificial infection with filtered material from a hog affected with cholera. The first rise up to the fourth day of sickness is caused by the primary infection, the second by the secondary infection. (Hutyra and Marek.)

closely to the one shown. In this particular case the animal in question would not, except during the very latest stages of the disease, have been condemned on account of its temperature: symptoms were not recorded until three days after the first decided elevation of temperature occurred; unless the animal was an exception, lesions sufficient to condemn it had not formed during the first day or two on which high temperatures were recorded. Thus there

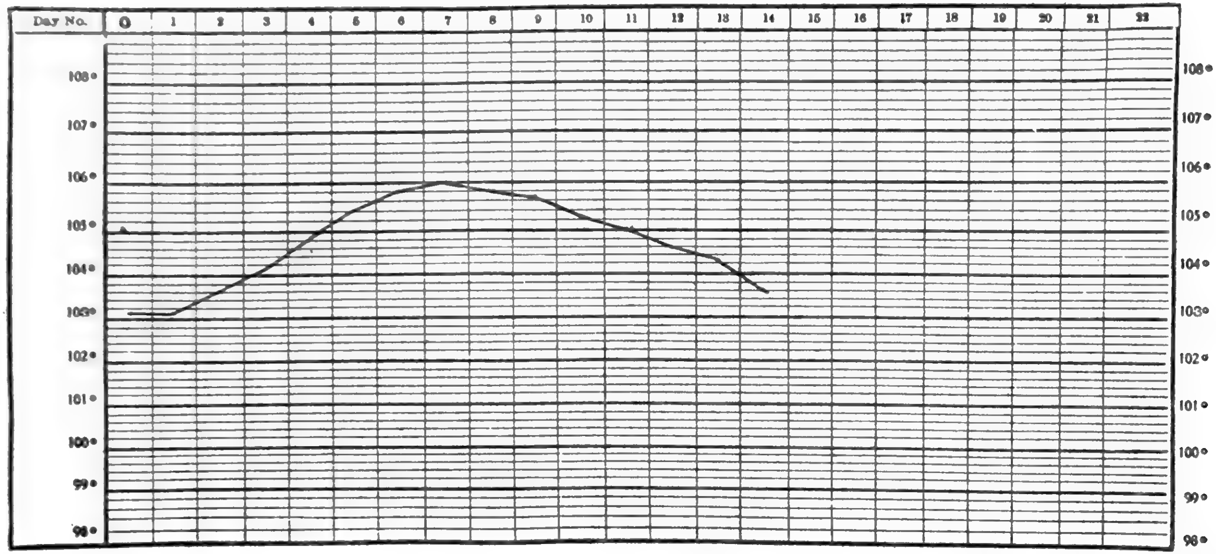
was probably a day or two during which its blood was infectious, when it would have passed inspection.

In order to show more fully something of the number of hogs that will not be rejected on account of high temperatures the following curve, prepared by Craig and Whiting, is reproduced. The animals were infected with intra-muscular injections of small quantities of hog cholera virus. There were 250 of them and the curve shows their average daily temperature during the course of the disease. A second curve, prepared by the same authors, shows the average daily temperature of twenty hogs exposed to cholera by means of natural infection.

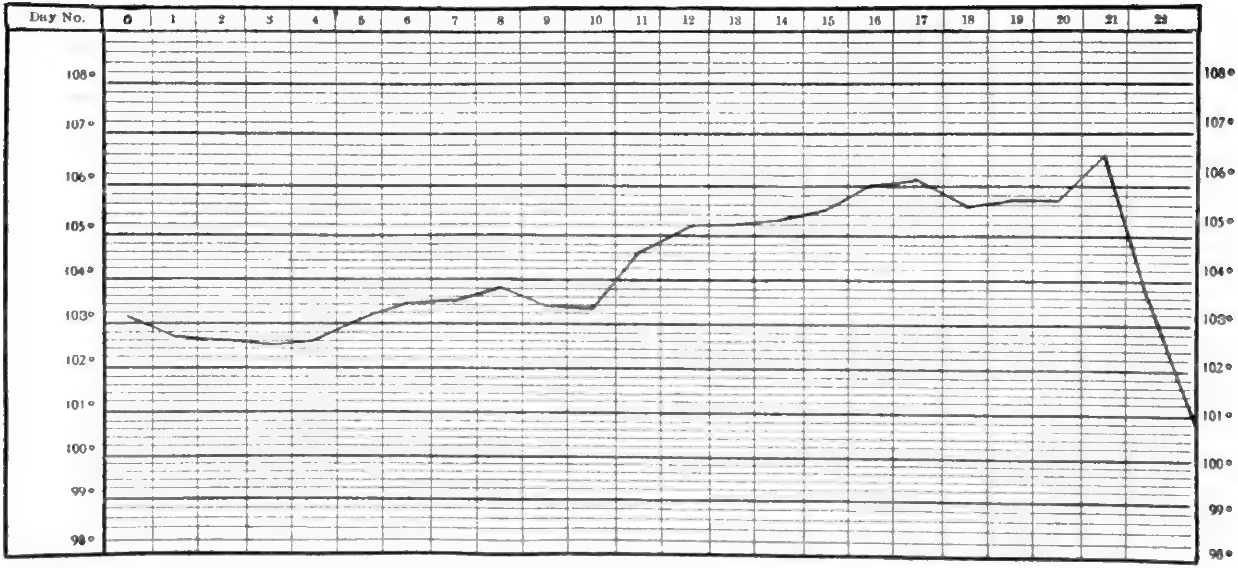
It will be understood that on any given day many of the temperatures were above and many were below the point indicated. It should also be remembered that there was a period during the time when the curve was ascending when a large number of normal temperatures were averaged with a few that were above normal. In this respect the curves are slightly misleading but taken as a whole they indicate that during the course of the disease most of the animals showed temperatures below 106° most of the time.

When the lesions are considered as a factor in determining which carcasses shall be condemned it is to be remembered first of all that in some cases, even when hogs are allowed to die of cholera, lesions do not form at all. Carcasses representing this class together with those that do not show lesions in organs other than the kidneys and lymph glands are allowed to pass. Hogs do not as a rule show marked lesions during the first day or two that elevated temperatures are recorded, and often the time between the first rise in temperature and the time when lesions sufficient to condemn are formed, is of much greater duration. Exemption of the kidneys and lymph glands from consideration unless there are lesions in other organs sufficiently well marked to cause carcasses to be sent to the retaining room, undoubtedly results in passing many virus carrying carcasses.

When table No. 2, is examined in its relation to the symptoms, temperature, and lesions necessary to condemn an animal or carcass for hog cholera, we cannot well escape the conclusion that *there is a time in the life of nearly every hog infected with acute hog cholera when it will pass inspection and when bits of pork from its carcass will prove infectious if fed to other swine.* This time varies from a few hours to several days and is measured,



The above curve was drawn from the temperature records of two hundred fifty pigs and shoats receiving one to two cubic centimeters of hog-cholera blood only. All were killed or died between the seventh and fourteenth days



The above curve shows the average temperature of twenty healthy hogs exposed to hog-cholera in infected pens All died of the disease

roughly, by the time required for the temperature to rise from normal to 106°, or by the time required for symptoms to develop or extensive lesions to form after the temperature curve starts upward. It is possible that the meat of some hogs is infectious even before the rise in temperature takes place, for it is to be remembered that hog cholera virus *causes* the elevation and it must therefore be present *before* the elevation occurs. Whether, or for how long, it is present in quantities sufficient to infect, and before the elevation of temperature occurs, are questions on which we have insufficient data.

Considering again the infected herd as it is unloaded from the car and comparing it with similar herds in the field in which observations have been made and temperatures have been taken, we cannot help knowing that there are often present in such herds considerable numbers of apparently healthy hogs that show high temperatures due to hog cholera. Some of these are weeded out on account of temperatures above 106°, and a few on account of lesions, but many cannot do otherwise than pass. How many, we do not know, but for purposes of comparison it may be stated that during the decade ending in 1911 a yearly average of 18000 hogs were condemned because of cholera.

Each infected carcass passed possessed almost infinite possibilities in regard to its final distribution. Parts may be worked up into sausage or cooked products and hams, shoulders, and bacon may be cured or shipped in fresh or refrigerated form to supply retail butchers. These facts, coupled with what our experiments have shown relative to the probabilities for the presence of hog cholera virus in market pork, readily lead to the belief that whatever may be the means of spreading hog cholera from herd to herd in different localities, its spread from locality to locality could, if all facts were known, be traced in many cases to shipping and slaughtering hogs in the early stages of cholera and the subsequent sale of pork from the carcasses of these animals.

The results of the experiments described suggest the need of preventive measures for the purpose of diminishing the number of infections due to feeding pork trimmings. These measures naturally fall into three general classes: first, measures to prevent marketing cholera infected hogs; second, measures to turn more carcasses from infected herds into products in which the virus will be killed; third, measures to acquaint swine breeders with the

danger involved in feeding garbage containing pork trimmings, and with the ways to avoid this danger.

Preventing the shipment of cholera infected herds should be the first object sought because it attacks the trouble at its source. There will be widespread infection as long as this is a common practice, and it will be a common practice so long as it is possible to sell infected hogs for the price that sound ones bring. Since the discovery of anti-hog cholera serum the breeder has in it an agent which at any given time will usually protect all of his hogs which are not, at that time, already dangerous carriers of the hog cholera virus. This statement is based on the facts that pork from hogs killed as soon as an elevation of temperature is recorded proves to be quite generally infectious, and that serum will usually protect hogs treated before an elevation of temperature takes place. Thus it is true that the enactment and enforcement of measures to prevent shipping cholera infected herds need not cause undue hardships in any place where hog cholera serum is available.

The economic difficulties involved in condemning or passing for sterilization infected carcasses which, in reality, are entirely fit for human food, are of a nature which render them very difficult to overcome. The scientific difficulties met in seeking to remove all carcasses that contain virus are no less trying. It has been shown that the carcasses of hogs that show no symptoms other than slight elevation of temperature, and no lesions whatever, may contain hog cholera virus sufficient to infect other hogs. Because the normal temperatures of swine vary so widely no mark can be set that will separate out infected animals with any degree of accuracy. A temperature of 104°, for instance, may be normal or three degrees above normal. There is no method known of detecting all virus carrying carcasses, but, as a general principle, we believe that rigid ante-mortem *herd* inspection with a more severe interpretation of temperatures and lesions in hogs that are members of infected herds, together with a tagging system rendering it possible to place losses due to condemnation with the man who ships the hogs, are worthy of consideration. Obviously measures of this kind would serve the double purpose of removing more infected carcasses from sale in the form of raw products, and of preventing the shipment of many infected herds that otherwise reach our markets.

Under existing conditions the most promising outlook for

dealing with this phase of hog cholera control consists in acquainting swine breeders with the dangers incident to feeding their own kitchen refuse, in case there are trimmings from market pork contained in it. The ordinary farmer has recourse to four very effective methods of protecting his herd from dangers incident to garbage feeding; he may keep pork trimmings out of the garbage, he may discontinue the practice of feeding garbage, he may cook all garbage before it is fed, or he may immunize his hogs. Men who collect and feed kitchen refuse from cities have recourse only to the two last named methods of protection.

It is sometimes suggested that statutory restrictions should be placed on feeding collected garbage to hogs. The objections to this practice are that it is in a degree repulsive, and that the heavy losses caused by it more than offset the gain it produces. The first objection is well sustained in many individual cases and in others it is not. The French have a saying, "Not what, but how", and this applies well to the point in question. If the material is fed fairly fresh and if the hogs to which it is fed are provided with clean quarters there are no very well sustained objections to the practice, for the material fed is in the last analysis only the refuse from what we ourselves eat. Many thousand hogs are fattened on garbage each year and statutory restrictions placed on the practice as a whole would not, especially since the discovery of anti-hog cholera serum, be justified.

Cooking kitchen refuse to destroy hog cholera virus contained in it is very effective in individual cases, and it possesses the additional advantage of rendering much of the material in it,—for instance potato parings,—more palatable and more nutritious. It could not, though, be well enforced as a sanitary measure; it is quite expensive in some localities, and, in order to be effective it requires more time and care than most men will give to it.

Serum-virus immunization seems to be the most logical means of preventing hog cholera in large herds that are fed collected garbage. It is effective, reasonably cheap, and has the decided advantage of protecting from infection by channels other than the one incident to feeding kitchen refuse.

Summary and Conclusions

1. Meat and bone taken from the carcasses of hogs killed before any manifestations of hog cholera other than elevation of tem-

perature take place, and at a time when they will pass inspection, will usually produce hog cholera when fed in small quantities to susceptible pigs.

2. In places where meat inspection is maintained, it is impossible, even with the severest interpretation of temperatures, symptoms and lesions now practicable, to remove from market all carcasses of hogs that contain hog cholera virus.

3. We believe a more severe interpretation of temperatures and lesions in hogs known to come from infected herds, will remove many more virus containing carcasses than are now removed, and without resulting in the condemnation of appreciable numbers of carcasses that do not contain virus.

4. The economic difficulties in the way of placing more severe interpretations on temperatures and lesions observed in hogs that are members of infected herds are worthy of study. Whether the number of virus carrying carcasses that pass inspection is large or small, the danger of new infections due to passing them is proportionate to the number passed.

5. In hog cholera infected carcasses that pass inspection:

The virus is not often killed in parts sold as fresh or refrigerated products.

The virus is often, but not always, killed in hams that are sugar cured. (In our experiments in twelve cases in twenty-one).

6. Anti-hog cholera serum will, at any given time, usually save all hogs in a herd the carcasses of which will not at that time, already prove infectious if small parts are fed to susceptible pigs.

7. Measures to prevent hog cholera infections due to feeding trimmings from market pork should include efforts to prevent marketing infected herds, efforts to prevent the sale of carcasses in products in which the virus is not killed, and efforts to acquaint swine breeders with the danger incident to feeding kitchen refuse.

8. Farmers can avoid the danger mentioned by discontinuing the feeding of kitchen refuse, by placing all pork trimmings elsewhere than in the garbage pail, by thoroughly cooking all garbage before it is fed, or by immunizing their hogs. Men who collect and feed city garbage can avoid the danger by cooking all the material they feed, or by immunizing their hogs.

Acknowledgement. The writer is deeply indebted to Dr. V. A. Moore whose keen interest in the work has been a constant source of encouragement, and whose advice has been frequently

sought and utilized during the four years in which the experiments were in progress.

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OSTEOMALACIA OR CAGE PARALYSIS IN PRIMATES*

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"Cage paralysis" or "cripples" is a condition of such frequent occurrence, particularly among the primates, that it forms one of the most serious obstacles to the maintenance of large and complete collections of wild animals in captivity. Undoubtedly osteomalacia of the primates, has long been confused with rachitis, which it very closely simulates, particularly in the slowly progressive cases where extensive deformities have taken place.

The lesions in the bones are very similar in both cases, and even clinically they closely resemble each other. The essential point of difference exists in that in rachitis we are dealing with a congenital state in which the bones were never normally calcified, while in osteomalacia the disease is an acquired one in which the once normally calcified bones become decalcified.

The differentiation, however, is clear and is now fully described in many monographs treating of osteomalacia and rachitis.

OCCURRENCE. The occurrence of this disease is not restricted to animals from any particular geographical area, or to any special season of the year, having come under our observation in each of the four seasons.

SPECIES AFFECTED. The disease among wild animals occurs in sapajous, macaques, marmosets, Diana monkeys, green mon-

*Presented at the meeting of the A.V.M.A., Detroit Mich., Aug. 21-25, 1916.

keys, baboons, orangs and chimpanzees in point of frequency in the order named.

AGE. The disease may affect either young or old animals. While there seems to be no marked relation between age and occurrence, it more frequently manifests itself in those animals which have been in captivity for some time, rather than in those recently arrived.

SEX. The disease occurs in both sexes. The greater proportion under our observation have been males. This is exactly contrary to the condition in man, where osteomalacia occurs almost exclusively in females, and is most commonly seen bearing a close relationship to the puerperal state. It is therefore interesting that in the species most closely allied to man, it occurs without this relationship, and in animals in which procreation during captivity is exceptional.

ETIOLOGY. While confinement has a manifest influence, we are still in the dark concerning the *essential* etiological factors in the causation of this affection.

A deficiency of earthy salts in the food would seem to be a natural explanation. The presence of an infection has been suggested, but if this exists, it must be habitually introduced in the food or water, rather than transmitted from animal to animal. Healthy animals have been associated with those diseased for an indefinite length of time, without apparent injury; and comparison to a similar condition in man, would seem to exclude this possibility. A morbid peculiarity of the constitution, and a special predisposition seems to be requisite for the causation. When this susceptibility to the disease exists, then exposure in ill-ventilated small and dark cages probably acts as an exciting cause.

Confinement in the smaller cages apparently offers some predisposition to the disease, since we have observed more cases developing in the smaller and darker side compartments than in the larger, more airy and better lighted ones. It is interesting to note in this connection that there has never been a single case in the large lemur cage, which is situated in the main corridor of the Primates' House in the New York Zoological Park, and which receives a great abundance of sunlight during a large part of each day. In this cage the conditions much more nearly approximate the normal habitat of the primates than we are able to afford in other portions of the building.

Age appears to play no definite factor in the production of the disease as we have seen it; though, as stated above, the time in captivity does seem to be an important consideration.

The question of possible primary hemic conditions must not be neglected, particularly as the disease apparently occurs most commonly, under conditions in which we might naturally expect a greater or lesser degree of anemia. We believe that primary anemia is not a frequent introductory condition, though secondary anemias are doubtless frequently present in the early, as well as the later stages of the disease, but apparently not as an essential primary inductive agent.

Duration. The disease is nearly always progressive, but we have observed numerous cases which were subject to at least temporary cessation, covering a period of several months. It may assume an acute or a chronic form. In the former case three to four months is the average, while mildly progressing forms may extend over a period of several years before a fatal termination.

Symptoms. While there are no positive premonitory symptoms which are characteristic of this malady, still there are certain signs, the appearance of which will justify a provisional diagnosis. One of the first symptoms manifested is that the subject becomes less active than usual, instead of running and leaping about from swing to swing, it sits on the floor or isolates itself in some far corner of its cage and takes very little interest in its surroundings except at feeding time; for the appetite generally remains good up to the later or terminal stage of the disease.

Gradually a noticeable stiffness is apparent when the animal moves about. This stiffness is most marked in the posterior extremities and generally progresses quite rapidly. During this stage, the animal is apparently free from pain, but of this one cannot feel sure, since we have observed that, as a rule, monkeys can stand considerable pain without any external manifestation of suffering. Later the movements of the animal become quite cumbersome, its actions resembling those of animals suffering from rheumatism. If the animal is closely examined, even at this early stage of the disease, it will be found that there are marked changes going on, especially in the bones.

Considerable alteration in the form of the thorax will be found. The resistance of the bones is greatly diminished, and they break under a slight strain, so that fractures (particularly green stick

fractures) and distortions are apt to be met with. Marked osseous changes may take place, apparently without constitutional symptoms. However, the patient soon loses its spirit and the general health fails.

The skin is dry and the hair lusterless. There is beginning emaciation, the muscles becoming soft and flabby. The animal is generally subject to frequent attacks of indigestion, accompanied by swelling and abdominal pain. No urinary manifestations are present in this stage of the disease.

Partial paralysis of the posterior extremities soon comes on, with atrophy of the muscles of the loin and limbs. The progress of the disease is now generally quite rapid, and the animal lies huddled up in a corner of its cage; if forced to move, rises languidly and with difficulty, and moves the limbs rigidly, as if they were without joints. Its locomotion is extremely cumbersome, generally using its long arms as a cripple would use crutches.

With constant decubitus the patient fails, rapidly becoming emaciated and weak. Abscesses and sloughs are common over the bony prominences of the pelvis and at the base of the tail. These ulcerations have a tendency to spread, forming irregular and sometimes deep sloughing excavations, with no tendency to heal. No pain is evident by manipulation of the partially paralyzed extremities. The *musculo-tendinous* reflexes are decreased or obliterated.

The paralysis of the posterior limbs increases, and the animal, becoming completely paraplegic, loses sphincteric control, with incontinence of urine and feces. Tactical and pain anesthesia develop in the involved areas so that a pin may be thrust into the feet or legs without the animal apparently noticing it.

Various distortions of the bony frame-work develop, even in the early stages, and these changes are most frequently noted in the spinal column and thorax, as well as in the long bones of the extremities, depending largely upon the superincumbent weight and muscular contraction. A deformity simulating the classical "pigeon breast" is shown. Respiratory embarrassment frequently results from these deformities. General anemia and bronchitis are nearly always associated with advanced cases.

While we have tried to picture typical cases of "cage paralysis," it is important to note that there is a wide margin of difference in respect to the degrees of severity which may characterize different cases, and the diagnosis is by no means easy, even to careful observers, in the early stages of the disease.

PROGNOSIS. This condition can never be accounted less than serious. While a case in its very earliest stage is much more hopeful than one that is far advanced, with bones extensively softened, yet the prognosis as to recovery is always bad. In the earlier and more favorable cases, the disease may apparently be arrested.

From the foregoing pathological lesions it is hardly to be expected that healing and regeneration of the extensively altered bones, or of the degenerated nerve tissue, can take place.

TREATMENT. In respect to the treatment to be recommended and instituted, we are of the belief that this can only be employed, with any rational hope of benefit, during the period of incubation, and with the anticipatory purpose of prevention. It is but seldom, however, that the necessary advantage of this early knowledge of the disease is secured, and when the true nature of the trouble has become apparent it is often too late to resort to the remedial measures which might have been employed in the early stages. We are using freely bone-dust and limewater in the food and water of our cases. Daily administration of pure olive oil with the food has a decided nutrient effect on these cases. Also the daily administration of the dried extract of thymus, thyroid and adrenal glands we believe to be of considerable value in treating this condition in the early stages of the disease. These substances being practically odorless and tasteless, are readily partaken of by the animals. When the morbid process of the disease was active, these remedies have been useless. While these substances may not act as a specific remedy, they certainly have a distinctively tonic effect in the cases in which we have used them.

Everything possible should be done to improve the general health; sunlight, dry and well-ventilated quarters are absolutely essential. A varied, as well as a nutritious diet, is very important. Care should be taken to select food containing a relatively proper adjustment of both organic and inorganic food elements.

The disease as it appears in primates is chiefly characterized by decalcification of the bones, but degenerative lesions of the central nervous organs are, though probably secondary, an essential manifestation of the disease.

PATHOLOGICAL ANATOMY. *General Nutrition.*—As a rule, the general nourishment of the body does not appear to suffer in the early or middle stages of the disease. The adipose is abundant, of normal color and consistence, as the animal eats well. As the dis-

ease progresses, a gradual shrinkage of the paralyzed extremities takes place (to be discussed under the appropriate headings); but the body, as a whole, does not suffer until secondary complications, such as bronchitis, hypostatic pneumonia and similar terminal conditions arise.

For these reasons it happens that the animals often remain satisfactory subjects for exhibition until the deformities or paralyses become sufficiently marked to attract the attention of the ordinary observer. In some cases, where the appetite remains good, probably as the result of the lack of normal exercise, the animal, particularly the baboons, may become too fat. Emaciation is, however, eventually an accompaniment of the terminal stages of the disease in all except the very acute and actively progressive cases.

Skin and Mucous Membranes. The color of the skin and mucous membranes depends largely on the condition of the blood. In the middle and later stages the hair becomes rough and brittle, or it may fall out in places. The surface of the skin is covered with thickened epithelial scales. Trophic ulcers at points of pressure, as over the tuberosities of the ischium, are common in the terminal state. They are indolent, gangrenous and show little tendency to heal. The mucosa of the tongue becomes covered with a thick coating and sores develop on the gums. As a rule these changes appear only in the later part of the disease and in the earlier stages no changes in these membranes are to be found. As a rule, the subdermal fat of the paralyzed extremities finally become atrophic.

Blood. On account of the lack of a well-established normal standard in each of the various species, blood counts and hemoglobin tests are unsatisfactory and we must rely, for judgment as to the hemic state, entirely on the general appearance of the blood and on the tissues in which it circulates, also on the morphological variations in the character of the cells. With these points as the basis of our comparison we believe that, as a rule, little or no change in the morphology of the blood takes place, except in the later stages of the disease, where many complicating conditions arise. The gross appearances of the blood, in terminal cases, exhibit the usual characteristics of extreme anemia and coagulation is oftentimes very much retarded.

Muscles. No definite alteration, which can be looked upon as other than entirely secondary, has been found in the muscles. There are no changes in those of the paralyzed extremities, except a general wasting with fat absorption, though occasionally there is a relative over-deposition of adipose. The muscle cells become atrophied, but no nodes of disintegration or of nuclear proliferation have been seen and the atrophy seems to be entirely one of disuse, occasionally accompanied by a pressure-atrophy following over-deposit of fat. The muscles away from the immediately involved extremities show no changes, except such as are entirely dependent on the secondary conditions induced by the disease. No lesions of the smooth muscle distribution have been found.

Osseous System. Disease of the bony tissue appears to us to be the essential characteristic of the disorder and it is on these changes that we classify the disease as osteomalacia, identical in all its essential particulars with the condition so fully described as it occurs in man and the domestic animals.

All the bones of the body, even those of the skull, eventually become involved. The changes are most obvious and deformity most prominent in those bones which may be looked upon as the *supporting framework* of the body; these are the bones of the lower extremities, particularly the femurs, the spinal column and those of the thoracic cage. The pelvis is relatively much less deformed than in man, probably because the weight of the body is less suspended on these bones in the monkeys, which ordinarily use the upper extremities for the purposes of locomotion, together with the lower. Very likely it is for this same reason that the thorax shows very early and much more pronounced deformities than is the case in the human.

One of the very earliest osseous deformities, consists in a bowing, usually a posterior kyphosis of the spinal column, most marked in the dorsal region associated with a marked hypertrophy of the lumbar and sacral vertebrae. Lateral deviations are, in our experience, out of the ordinary. This deformity is quite as frequent in the straight-backed monkeys as in those which present a normally curved spinal column. The position, already described, which the animal early begins to assume is doubtless largely reponsible for this very marked deformity.

The thorax presents some of the most typical malformations. The lower ribs generally become more widely separated, while the

upper ones, particularly those to which the pectorals are attached, become bowed in, sometimes forming a peculiar letter S deformity. Ordinarily this causes a throwing forward of the sternum, producing in some cases a typical "pigeon breast". The points of juncture of the ribs with the costal cartilages become enlarged, causing nodes like those typically seen in rachitis (the "rachitic rosary"). Special types of deformity of the thorax may be seen, depending largely on the physical habits of the particular animal and on the character of the spinal column deformity.

The bones of the lower extremity are usually more or less deformed, ununited fractures may be present, surrounded by uncalcified fibrous callus. As a rule, an outward lateral curvature is presented, but on account of the early paralysis and since the animal very soon learns to support itself on the upper extremities, swinging the body between the arms as in using crutches, the relief of weight from the lower extremities doubtless prevents extreme deformity of the bones. In our opinion the bony changes are inaugurated in the bones of the lower extremities, if we may judge from the symptoms first manifested and from the earliest development of deformity. The ends of all the long bones frequently become enlarged.

Changes in the pelvis are not very marked and, as a rule, the form is fairly well preserved, but, consequent upon deviations of the column, various lateral deflections may be seen. The most frequent deformity, while not really one of the pelvis itself, is the development of an unusually acute angle at the juncture with the lumbar and sacral column.

Deformities in the upper extremities are not usually present, except for increase in size of the epiphyseal ends of the bones and, as a rule, these appear rather late in the disease. This is probably due to the fact that involvement of the upper extremities of the animal are among the very later stages of the disease, and ordinarily before the animal has proceeded so far he has either succumbed to the terminal processes or, having become unfit for exhibition, has been killed.

Deformities of the skull have not been noted by us, although the bones are found extensively softened and thickened.

There is no question in our minds but that the degree of deformity is dependent mostly on the amount of weight of pressure to which the individual bones are subjected, since, in the various parts

of the body, all of them are found to show the essential pathological changes in about equal degree, though we believe that they are inaugurated in the lower extremities and spinal column. In the terminal condition any of the bones, even the petrous portion of the temporal bone, may be readily cut with a scalpel without previous decalcification.

As a rule, where secondary injury is not present, the diseased bones present on their external surface very little indication of disease and none of inflammatory reaction. Periostitis occurs, we believe, only from some outside cause and generally the bone is smooth, though the epiphyseal ends appear symmetrically swollen. The animals ordinarily evince little or no pain on pressure of the bone, even to the point of crushing it, for in a large proportion of cases the femurs, for instance, may readily be broken with the fingers. One must remember in this respect, however, that many of these animals do not appear to be very sensitive to pain from any cause.

The gross appearance of the sectioned bone varies greatly. Generally the compact external plates are considerably thinned, the marrow space being considerably increased. As a rule, the outer shell presents a certain amount of lime salts and is still more or less hard, but in some cases, particularly near the epiphyseal ends of the bone, it is found to be soft or semi-elastic, resembling in its physical attributes cartilage more than bone. The periosteum shows no notable change in most cases. In the cases of the large flat bones, the entire thickness is transformed into an even greyish semi-cartilaginous material.

The bone marrow also varies greatly in appearance; in places, usually in the shafts of the long bones, it is bright red in color and presents semi-solid areas resembling nodules of cartilage. In the epiphyseal ends, and sometimes throughout the shaft as well, the medulla is represented by a diffuse soft greyish mucoid material in which fine spicules of semi-cartilaginous bone are found representing the normal compact framework of the marrow and cancellous portions. Where cartilage and bone are closely united, as over the head of the femur or between the vertebrae, the marrow seems to have extended into and replaced the cartilage to a large extent. Occasional cystic cavities are found both in the cancellous portions and in the marrow proper; these spaces are generally filled by a semi-fluid, mucoid or colloid material.

The microscopic alterations vary and apparently without direct relationship in any instance to the special animal or to the circumstance under which the disease developed.

Some of the bones show an almost complete replacement of the normal marrow tissue by compact masses of cells; small round cells, multinuclear giant cells, and large polymorphous cells, the elongated processes of which form a supporting stroma. Blood vessels, most of them newly formed, are found quite abundantly and about them are seen plasma cells. Extravasations of blood, with resulting disintegration and pigment deposition, are seen commonly. The giant cells are very numerous in places and are so distributed throughout the tissue as to closely resemble the structure of giant-celled sarcoma. As a rule, in these instances the endosteum is largely replaced by an incomplete layer of large osteoclasts about which absorption of the compact tissue is obviously taking place. Absorption of lime salts and removal of the organic framework of the bone apparently takes place jointly and at the same time. In many of the cases marked lacunar absorption is also apparent in the compact tissue. In general, no effort toward the formation of new bone or cartilage is to be seen; but occasionally areas are found, notably in the epiphyseal ends, where nodules of a typical cartilage are being formed, but in none is calcification taking place, the processes not even extending on to the formation of osteoid tissue. In some bones, and these we believe to be taken from the more slowly progressive cases or those in which for the time being the disease has been arrested, this abnormal marrow has been replaced by a mucoid tissue, which has occasionally broken down into a fluid, forming the cysts mentioned above. Where marrow destruction is so extreme, as in specimens of this kind, it is difficult to understand how regeneration of the red corpuscles can take place, hence more or less anemia must be expected as a direct sequence of these lesions.

Another type of changes found partly in the same skeleton as the above, and also alone in separate cases, comprises the alterations described as typifying true osteomalacia. In these bones lacunar absorption is not apparent, but instead the marrow is limited off from the compact tissue by a relatively normal endosteum which encloses no osteoclasts but internal to which is found a layer of osteoid tissue, possessing all the organic structure of normal bone, but from which the lime salts have been removed. Except

in this one particular the tissue seems in many ways to be normal. In places, however, the osteoid layer, particularly about the larger Haversian canals, is becoming infiltrated by large polygonal cells, small round cells, and new blood vessels are beginning to form from those originally in the Haversian canal, apparently tending toward the condition noted in the so-called marantic cases.

Vascular System.—Changes in the heart are neither characteristic nor constant. Fatty degeneration of the myocardium is, however, not infrequently found, and in the acute terminal cases parenchymatous alterations may be present.

The arteries also occasionally show fatty degeneration of the intima, as a rule, more pronounced in the larger trunks. Some of the smaller visceral vessels show occasional interstitial increase or arterio-capillary fibrosis; and hyaline degeneration, particularly in the vessels of the brain and cord, is not infrequent.

Digestive Tract.—No changes except a general anemia have been observed and the clinical manifestations indicated normal digestive function except in the later stages of the disease.

Pancreas and Digestive Glands.—No lesions bearing on the disease have been discovered.

Liver.—More or less pronounced fatty degeneration is usually seen, probably largely the result of chronic congestion which is almost invariably present. Not infrequently perivascular interstitial hyperplasia, sometimes with round-celled infiltration and active interstitial hepatitis, is found.

Respiratory Tract.—Bronchitis is ordinarily present in the middle or latter stages of the disease; not infrequently it extends to broncho-pneumonia which is very often the immediate cause of death in these cases. Chronic congestion of the lungs is also very common. These animals appear particularly prone to tubercular infection when the process is either extensive in, or entirely localized to, the lungs and the adjacent lymph nodes, from which a general infection is very likely to arise.

Spleen and Lymph Nodes.—Congestion and sometimes acute hyperemia of these structures is present. As a rule ,they are more or less enlarged, due to acute chronic hyperplastic lymphadenitis.

Ductless Glands.—The thyroid gland shows no lesions, it is apparently neither increased nor diminished in size. The thymus body shows no variations from the normal. The adrenal glands frequently show congestion, with slight fatty degeneration of the cortical cells.

URINARY TRACT.—The kidney ordinarily shows more or less congestion with fatty and parenchymatous degeneration and occasionally slight interstitial nephritis. The bladder exhibits no alterations and we have never found it to contain calcareous deposit, as has been reported in occasional cases in man (Dock, *American Journal of Medical Science,* p. 499, 1895.)

GENITAL GLANDS.—The disease has been found, in our cases, most frequent in males, even those presenting the osseous lesions supposed to be characteristic of "true osteomalacia," and we are therefore unable to state as to the relationship between the ovaries and osteomalacia in the primates, through the bearing of the puerperal state and the development of the disease in man seems to be well established. It is noteworthy that the primates chiefly affected rarely reproduce in captivity or show any marked sexual proclivities. In so far as we have investigated the disease, there seems to be no pathological changes present in the genital glands of either sex.

CENTRAL NERVOUS SYSTEM.—Changes in the central nervous system are constant in the well-developed stages of the disease and the symptoms arising from this involvement of the brain and spinal cord are among the most characteristic of the conditions, tending to overshadow the osseous alterations. Probably for this reason the condition has been commonly looked upon as a primary disease of the central nervous system and it was along these lines that we first undertook the study of the malady. In the light of more recent observation it appears to us that the osseous lesions precede those of the central nervous organs, which are probably secondary, though we must not forget that some observers still look upon the osteomalacia as a tropho-neurosis (Fehling: see Mallard. "Osteomalacie a' forme nerveuse." *Bull. Soc. med. d. hop. de Lyon,* 1903, II). It does not appear at all strange that the disease should have been so long considered as one primarily of the nervous organs, since in the study of these animals it is often impossible to properly inspect or palpate them, and we are more dependent on the study of the movements of the animals. From simple observation alone, one cannot fail to be impressed with the idea that the disease is chiefly a muscular or nervous disorder, and it is only when we are able to closely inspect the animals that the earlier changes in the bones with their deformities can be made out. In reviewing the literature of osteomalacia as it occurs in man, we have

been struck with the meagre account of the nervous lesions which accompany the disease in the human, probably because the prominence of the osseous changes has overshadowed them. Many otherwise careful descriptions of the disease entirely omit this important system.

It is probable that the malnutrition and anemia which accompany the disease are largely responsible for the lesions of central nervous organs, but these alone, to our minds, do not satisfactorily explain all the changes which we have found in the brain and spinal cord. Doubtless the deformity of the spinal column with pressure on the cord, posterior root ganglia and nerve roots, causes certain of the lesions, but in our opinion there is still a more close relationship existing between the disease and these alterations which may be directly and independently produced by the essential etiological factors. We are as yet unable to give a plausible explanation of this relationship. It seems to us most likely the changes develop secondarily or after the bony lesions are comparatively well advanced, since in one instance, one of the earliest cases studied by us no degenerative alterations of the spinal cord were found. Again the great variation in the affected tracts noted in our cases would apparently indicate that the disease was not a primary or specific one of the central nervous system for the lesions are not constant but variable.

The alterations found in the brain consist of chromolytic changes in the ganglion cells, and of a dilatation of the lymph spaces associated with more or less congestion of the cerebral vessels. The degenerative factors seem to have a particular selection for the cells of the motor cortex, if we may judge from the changes found in the spinal cord.

In the cord the most common lesions noted by us have been degenerations of various tracts, most constantly of the direct and crossed pyramidal tracts; also the columns of Gall and Burdach (see reports). Lesions simulating those of poliomyelitis have been seen, and in general changes like those found in the brain. The blood-vessels of the cord, almost without exception, show pronounced alterations, and it is highly probable that these are in a large degree responsible for certain of the degenerated cells and fibers. The posterior root ganglia have been found to show diseased ganglion cells in some of the cases with a consequent degeneration of the posterior nerve roots. The anterior nerve roots have also occasionally presented degenerated fibers.

CASE X. *Macaque* (*Macacus cynomolgus*). This was a mildly progressing case of "cage paralysis," extending over a period of one year. Only at the late stage of the disease were emaciation and atrophy of hind limbs marked features.

POST-MORTEM SUMMARY. *Body*—Shows marked atrophy; curvature of spine. *Heart*—Diastole, normal. *Lungs*—Pigmented; otherwise normal. *Liver*—Congested. *Kidneys*—Congested. *Spleen and Lymph Nodes*—Congested. *Stomach and Intestines*—Anemic. *Genito-Urinary Tract*—Negative. *Osseous System*—All bones show general softening. Thorax laterally compressed. Ribs almost entirely cartilaginous. *Lumbar vertebrae* enlarged, softened, and showing quite extensive anterior curvature.

BLOOD EXAMINATION (specimen taken from the ear, just before animal was killed). Hemoglobin 65 per cent. (Dare). On drawing the blood it was found to be abnormally light in color and to flow very slowly, being of a somewhat gelatinous consistency like the blood in leukemia. It clotted rapidly, but the resulting clot was not so firm and compact as normal.

The red cells are found to vary greatly in size, many microcytes and macrocytes being present. Poikilocytes are numerous, but no degenerated cells were found. A few normoblasts were found and a few megaloblasts. Blood plates are very numerous. Leucocytes are found to be relatively very frequent, a few of them are pigmented, and one very large mononuclear leucocyte was found. The different leucocyte count shows:

Polynuclear neutrophiles	67.0 per cent.
Lymphocytes	27.5 per cent.
Mononuclears	0.5 per cent.
Transitionals	3.0 per cent.
Eosinophiles	1.0 per cent.
Basophiles	1.0 per cent.

The granules in the eosinophilic cells are notably smaller than in man, otherwise the cells do not appear to differ much from those found in the human.

BONE MARROW (*Smear*). Many abnormal cells are present. Giant cells, for the greater part polynuclear, with eosinophilic granulation are numerous. In some of them a typical karyokinesis is demonstrable while large megaloblasts showing almost any stage of karyokinesis are not infrequent. Dividing normoblasts are common. Notable is the large number of leucocytes with baso-

philic granulation, the granules being notably smaller than in man. Phagocytic cells, leucocytes and giant cells are very common. Many of the erythrocytes present show very extreme degenerative alterations and free pigment granules are commonly found.

Microscopic Examination. *Cervical Cord*—The membranes of the cord show nothing abnormal. There is slight irritation of the perivascular and pericellular lymph spaces and some of them contain slight exudation of small round cells. The ganglion cells of the anterior horns show no alteration. Segments prepared by the Busch modification of the Marchi method show no degenerated fibers either in the columns of the cord or in the surrounding nerve trunks.

Dorsal Cord. The same changes noted in the cervical cord are also present in the dorsal segments. A few of the ganglion cells show, however, an abnormal brownish pigmentation. No degenerated fibers are demonstrable by the Busch method.

Lumbar and Sacral Cords.—Changes similar to those described above are present. The entire spinal cord as represented by these sections may be said to be practically normal.

Spleen.—The blood vessels are markedly congested throughout and there is a general extravasation of red blood cells through the splenic pulp. The Malpighian bodies show many evidences of acute lymphoid hyperplasia. Extensive areas of pigmentation are present in places, apparently resulting from the breaking down of many red blood cells.

Bone, shaft of femur.—The fatty tissue of the marrow is largely replaced by dense masses of mononuclear and polynuclear leucocytes, fibroblastic and plasma cells, among which are found frequent multinuclear and mononuclear giant cells. Evidences of karyokinetic division are frequent among these cells, but in places fibroblastic cells predominate and a mucoid-like tissue is found replacing the marrow. Osteoclasts are found abundantly at the juncture with the compact tissue and these cells have largely replaced the endosteum and, in places, are evidently causing active resorption of the osseous tissue. Some of the larger Haversian canals in the compact bone are surrounded by osteoid tissue from which the lime salts have evidently been removed leaving the general structure very similar to that of normal bone with the exception that the bone cells have become considerably altered, being

larger, more numerous, and presenting evidences of reproduction. Osteoclasts are absent, except in the larger of these spaces, and the process does not seem to be primarily lacunar absorption.

CASE XI. *Sapajou* (*Cebus hypoleucus*). This animal had been in captivity several years before being deposited at the Park. Paralysis was not a feature of this case and reflexes were present in the hind limbs. On palpation a considerable alteration in the shape of the thorax and especially of the sternum was found. The animal was killed in the early stage of the disease, which probably accounts for the absence of anesthesias of the posterior extremities.

POST-MORTEM SUMMARY.—*Body*—Shows marked emaciation. *Heart*—Normal. *Lungs*—Bronchitis. *Liver*—Congested. *Spleen and Lymph Nodes*—Anemic. *Stomach and Intestines*—Contained considerable partially digested food. Mucous membranes, anemic. *Osseous System*—All the bones softened, easily fractured. The long bones consisting of a thin rim of compact tissue, containing thin gelatinous blood-stained marrow.

BLOOD EXAMINATION MADE IMMEDIATELY BEFORE DEATH.—The blood presented less gross changes than in the previous case, clotted more naturally and was less gelatinous in character. Hemoglobin determined by the Dare instrument showed 74 per cent.

The size of the red cells varies considerably, both macrocytes and microcytes being present. Poikilocytosis is marked, but the relative amount of hemaglobin staining is about natural. Megaloblasts and large mononuclear leucocytes, occasionally showing cell division, are to be found in considerable frequency, and a few normoblasts are also present. No cells showing cytoplasmic degeneration were found.

A few pigmented leucocytes, both lymphocytes and polynuclears were found. The differential leucocyte count shows the following:

Polynuclear neutrophiles	56.5 per cent.
Lymphocytes	35.0 per cent.
Mononuclears	2.5 per cent.
Basophiles	0.5 per cent.
Eosinophiles	4.5 per cent.
Transitionals	1.0 per cent.

CERVICAL CORD.—Membranes of cord, negative. Dilatation of the lymphatic channels, particularly of the perivascular and pericellular spaces. Some of the blood vessels show slight hyaline de-

generation. The ganglion cells of the anterior horns show nothing abnormal.

Scattered degenerated fibres are present throughout the entire transverse section of the cords. They are widely separated and are apparently no more abundant in one column than in another. Collectively they are very few, as compared with the normal medullated fibers.

Dorsal, Lumbar and Sacral Cord.—The changes throughout these levels are similar to those present in the cervical cord.

Spleen.—The blood vessels throughout are markedly congested and extravasations of red cells into the splenic pulp are present, in greater or less degree, throughout the entire tissue. Extensive destruction of these cells is taking place and pigmentation resulting from this disintegration is general throughout. The Malpighian bodies in this species appear to be very small, but in places they have been encroached upon by a chronic perarteritis.

Bone, shaft of femur.—The marrow is completely replaced by a dense mass of cells, among which mononuclears and epithelioid cells appear most frequently. Polynuclear leucocytes, fibroblasts single and multinucleated giant cells are also frequent. Normoblasts are found in but relatively small number and extensive destruction of blood cells appears to be taking place, as evidenced by the presence of phagocytic endothelioid cells, the cytoplasm of which is literally crammed with broken down red cells. The endosteum is intact in most places, but in other areas is largely replaced by groups of osteoclasts which are evidently causing absorption of the adjacent compact tissue. The Haversian canals of the compact bone are surrounded by broad zones of homogeneous osteoid tissue which is limited from the compact bone by a fibrous band resembling endosteum. Extravasation of red blood cells into this tissue is present in places, but in other areas it is strictly osteoid in character, though, as a rule, the Haversian vessels in the larger areas are surrounded by cellular tissue resembling that of the marrow. A few of these spaces show an apparent cartilaginous formation resulting in replacement of the vessels and normal tissue. Not infrequently the blood vessels appear to be plugged by hyaline thrombi.

DISCUSSION

Dr. Hadwen: I would like to ask about the hair of these animals. I have been very interested in a disease which we think is

close to osteomalacia. In all these cases, the hair has grown tremendously long, and the skin has become very dirty. These were among the first symptoms noticed. Following that there was generally neuritis of the hind parts.

Dr. Fitch: I would like to ask Dr. Blair if he has made any blood examinations in these cases; further whether the initial changes are just of the bone, or whether they are changes of the nervous system; whether the changes of the nervous system are just in the cord, or in the sheath of the cord primarily.

Dr. Brimhall: Do I understand that the bone tissue has changed so that the calcified portion has diminished? Again what would be the cause of fractures in those cases where the bone has lost most of the calcareous substance?

Dr. Blair: In answer to Dr Hadwen's query, I have not noticed the condition in our animals that he described in the pig. I do not know how to account for the apparent stimulation of the hair in the early stages which you seem to find in the pig.

In reply to Dr. Fitch, I would say that if my paper had been completely read, it would have answered his question fully; I will just report the blood examination of two cases, which will perhaps answer his query.

Of course, since there is no normal standard for hemaglobin and other tests in the large group of animals like the primates, we had in forming our basis to take the conditions as we found them. In case No. 10 or 11, the blood itself showed polynuclear neutrophiles, 67.0 per cent; lymphocytes, 27. 5; mononuclears, 0.5 per cent; transitionals, 3.0 per cent; eosinophiles, 1.0 per cent; basophiles, 1.0 per cent. In the next case the hemoglobin would show 56 per cent. The hemaglobin test in case No. 10 is 65 per cent, and the other 74 per cent.

There was one other question as to why we expect fractures in the bones in which there was so much decalcification. Of course, we never find a bone in which decalcification has entirely taken place; so that the compact tissue really acts as a shell. It is much easier to fracture that thin shell, than if there was no shell running through, and the bone would bend instead of break. The green stick fractures are common, and it is due to that reason.

Dr. Hadwen: What are your normal polynuclears?

Dr. Blair: That is a point we have not been able to determine. There has been no work on that particular thing. I rather think we find it as high as 87 per cent. of hemaglobin in normal animals.

As to Dr. Fitch's other question: we believe that the changes occur first in the bony tissue, and that the changes in the cord are really secondary, due to pressure probably on the sheath; and gradual absorption from that, and the pressure from the deformed bones, rather than a true locomotor ataxia condition.

ABORTION IN DAIRY CATTLE*

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As early as 1912, I took a position in reference to the contagious abortion of cattle somewhat out of accord with the prevailing views of veterinarians and breeders. Among the more salient statements, or conclusions, at that time were:

(1) Contagious abortion is a widespread—well nigh, if not quite universal—and highly destructive affection of cattle.

(2) It induces many symptoms, commonest among which are sterility, abortion, premature birth and metritis with or without retained afterbirth.

(3) The phenomenon of abortion can not be reliably induced in cattle experimentally.

(4) There is no accurate means for diagnosing contagious abortion.

(5) There is no natural immunity acquired in abortion parallel to that of some acute infectious diseases, such as foot-and-mouth disease, smallpox, etc.

(6) Although the infection may invade the organs of cattle through various avenues, it can induce sterility (when uterine), abortion, premature birth, and retained afterbirth only when a large volume of virulent infection exists in the uterine cavity.

(7) The chief avenue by which the infection enters the uterine cavity is through the cervical canal. The studies of the intervening four years have largely overthrown this belief.

(8) The infection generally exists in the uterine cavity or in the cervical canal prior to conception, or it is introduced at the time of breeding or early thereafter, prior to the sealing of the uterus.

(9) There is no cure for abortion and no means of eradicating the infection from a herd.

(10) Abortion may be largely controlled and its ravages greatly lessened by a comprehensive plan of hygiene, especially of sex hygiene, in breeding and dairy cattle. Developments during the intervening four years have brought forward the care of the new-

*Presented at the twentieth annual meeting of the United States Livestock Sanitary Association, Chicago, Ill., December 1916.

born calf as the most fundamental and essential element in the control of abortion.

The idea advanced that the infection is universal has gained much ground and it is becoming more and more apparent that such phenomena as abortion, metritis, retained fetal membranes, the strong reactions to serologic tests, etc., are not so much dependent upon the presence of the infection as upon its volume, virulence, and location. Schroeder and Cotton, Evans, and others have shown that the milk of many dairy cows is contaminated with abortion bacilli, but how few cows, if any, do not have the bacillus in their milk has not been determined. The more it is searched for, the more found. The wider application of the serologic tests has constantly shown a more and more common occurrence of the infection, especially a more general infection of new-born calves.

During the four intervening years, there has been a notable change in the views of breeders and dairymen in connection with the distribution and frequency of the abortion infection. Many breeders of pedigreed cattle especially are convinced of its universality. They recognize in this a distinct advantage instead of a handicap in their fight with the scourge. They are now viewing the disease intrinsically instead of extrinsically. They are no longer directing their sole care and thought to preventing the introduction of the infection from a neighbor's herd, but are studying critically the dangers within their own herds and gradually introducing measures to control the disease at the center without forgetting the circumference. They are commencing to realize that a belief that their herds are free from the infection is a delusion and a tremendous peril and that their safety lies in the assumption that the infection is present and that only eternal vigilance can prevent it from stealthily assuming virulence and momentum to break unannounced as a relentless storm spreading destruction on every hand.

Researches since 1912 have justified abundantly the addition to the prominent complications of contagious abortion of the white scours and pneumonia of calves. Interesting evidences of the important role of the abortion organism in these affections have appeared in the annual reports of the N. Y. State Veterinary College, especially in that for 1914-15, and yet more convincing evidence will appear in the forthcoming annual report now in preparation.

Vital Statistics of 18 Heifers in Herd A, given Abortion Bacterins in First Pregnancy, with Female Progeny.

Number	Born	1912	1913	1914	1915	1916	Remarks
1	12.6.09	A					Destroyed 10.9.12 Gangrene of the Uterus Decomposition of Foetus
2	10.6.09	A					Died of Metritis
3	2.24.11	S or A Unseen					Slaughtered on account of Sterility
4	10.30.10	S or A Unseen		A			Slaughtered on account of Sterility
5	9.6.10	A	A	S			Slaughtered on account of Sterility
6	9.29.10	X B		B H (♀6A)		B	Slaughtered on account of Sterility
6A	11.8.14			*		B	
7	11.6.10	A	B(twins)	D			Died of Metritis
8	4.26.11	H (♀8A)					Slaughtered on account of Sterility
8A	12.8.12	*		A			Slaughtered on account of Sterility
9	7.20.10	B					Retained afterbirth Sold on account of inefficiency
10	1.1.11	B	B				Sold-account of Bad Udder Gangrene Half Amputated
11	2.5.11	S or A Unseen	B	B	B		Sold-account of Low Dairy efficiency
12	9.22.10	A	H (♀12A)	B			Died of Indigestion - 1915
12A	11.26.13				H	H	
13	10.5.10	H (♀13A)	B	H	B		Sold - Efficient
13A	11.27.12	*		A	H	B	
14	10.20.10	H (♀14A)		B	B	B	
14A	12.9.12	*			H		Sold - Efficient
15	10.18.10	B	H		B B		1913 Heifers died 2.10.14
16	10.5.10	A	B	B	B	H	
17	10.5.10	A	H (♀17A)	B	H (♀17B)	H	
17A	9.10.13			*	B	S	
17B	9.8.15				*		
18	12.9.10	A	H (♀18A)	H	H	B	1914 Heifer died from Indigestion
18A	12.31.13		*			B P	

Died or Killed - - - - - - - - 10
Sold in Breeding Condition - - - - 5
Remaining in Herd of Dairying Age } - - - - - - 11

It was stated in 1912 that there is no natural immunity acquired in contagious abortion such as is observed in most acute contagious diseases, like rinderpest and foot-and-mouth disease. Abortion is a chronic disease. The outstanding difference between an acute and a chronic infection is in their power to produce immunity. In acute infections there is an immunity against invasion; in chronic infections there is an immunity against the disease-producing power of a persisting infection. Perhaps that thought can be well illustrated by the use of the chart of the eighteen heifers recorded in 1912 under experiment with abortion bacterins, bringing the history of the group down to date. As recorded in 1912, each of the eighteen heifers received four doses of the then very popular abortion bacterins, in order to test its power to prevent abortion.

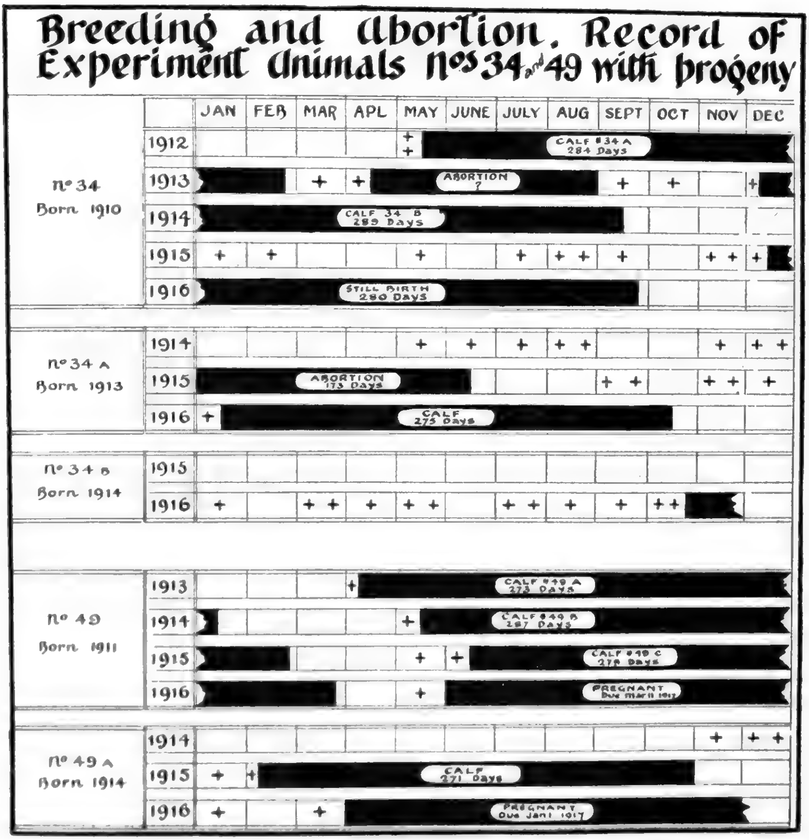
Assuming that each of the eighteen heifers should have calved once a year and that one-half the calves would be heifers, there should now be in milk, counting the eighteen heifers, their daughters, and four granddaughters, a total of forty-nine females. Instead, there exist in the herd eleven females of dairying age, Five cows, presumably capable of breeding, have been sold, and ten have died or been killed. In short, the size of the original group has been diminished by five animals, or 28 per cent., counting in the group all the female progeny of dairy age. This certainly indicates that no valuable immunity is caused by severe infection. Incidentally, also, the charts tend to negate the contention of those now claiming to prevent abortion by hyperinfection prior to conception. These were certainly hyperinfected when two years old, and have been liberally infected ever since. If that would prevent disaster in later years, this group should have become highly valuable.

The principle which I wish to bring out may be further illustrated by Numbers 34 and 49 of our research herd. Each was purchased at birth and has been under constant observation up to the present time.

Number 34, a strong heifer, apparently well, was inoculated in the jugular vein during her first pregnancy with a large volume of abortion cultures. She gave birth at full term to an apparently healthy calf, our Number 101 (No. 34a of chart). She then conceived with difficulty, aborted two or three times unseen, and finally gave birth to a healthy calf, our Number 3 (No. 34b of

chart). After much difficulty, she conceived again, to abort on September 20, 1916, at the 280th day of pregnancy. Following this, she almost died from metritis. Her afterbirth was retained for eight days and when it came away all the cotyledons came with it. Her first calf, Number 101 (No. 34b of chart), in utero

Chart II.



when 34 was inoculated, born 1912, was caused to conceive only with very great difficulty. Apparently she aborted once or twice unseen. Then she conceived, to abort at 173 days. She finally conceived again, to expel prematurely, upon the 276th day of pregnancy, a heifer calf weighing 65½ pounds. Her placenta was retained, and, as in her mother a few weeks before, the cotyledons became necrotic and sloughed away. It required the best

attention we could give them to preserve their lives. Whether they will ever breed again, is a wholly different question.

The heifer calf of Number 101 (No. 34a of chart) was evidently ill at the time of birth. She was dull and appeared in a stupor; she lay down most of the time and refused to eat; her meconium, or fetal feces, was swarming with bacteria; her large intestine was one great cesspool of infection. After vigorous handling with calf scours serum, she rallied and began to grow. She had the infection abundantly when she was born.

The second heifer of Number 34, our Number 3, born in September, 1914, has given great trouble in breeding. She has apparently conceived twice and aborted unseen. Her genital organs are normal, as far as physical examination reveals, but she simply refuses to become pregnant.

Number 49 has been served five times, has produced three healthy calves, and is due to calve in March, 1917. During her first pregnancy, she was fed a liberal amount of pure cultures of abortion bacilli. Since 1913 she has been the constant companion of Number 34. She has also been in the same stable—and in an adjoining stall with an open partition—with the aborter Number 101. She has run in the paddock with her. One of her mates of the same age aborted in the pasture where she was grazing during her first pregnancy. She has been exposed and re-exposed, naturally and experimentally.

The first heifer of Number 49, our Number 1 (No. 49a of chart), bred promptly and calved perfectly before she was two years old. The calf, Number 11, is strong, well developed, and healthy. Number 1 conceived again very promptly, and is due to calve on January 1. The blood of Number 34 has always reacted high; the blood of 49 has always reacted low. The blood tests of the calves of 34 have averaged very high; the blood tests of the calves, even including the second generation, of 49 have always been low. Number 34 and her daughters have always given great trouble in breeding; Number 49 and her heifer have bred promptly.

Number 49 has withstood all the exposure of Number 34, except that her experimental infection was given per mouth instead of in the jugular vein. She has suffered from no serious disaster and has today a higher power of resistance than 34. In other words, the exalted power of resistance—call it immunity or what

you will—has been acquired, not through disaster, not through abortion, sterility or retained afterbirth, but through the avoidance of these.

In 1912 the prevalent belief was that most of the abortion in heifers during their first pregnancy resulted from infection by the ingestion of contaminated food. This I held to be untenable. Its advocates had not designated what food was contaminated, how it was contaminated, or when it was eaten by the animal. The hypothesis was without any secure foundation.

The discovery of the abortion bacillus in the milk of dairy cows shed new and highly important light upon the question of food infection. The calf, in taking raw milk which contains the abortion bacilli, necessarily becomes infected so far as the alimentary tract is concerned. The fact that it has been shown that the milk of many cows is contaminated with the abortion bacillus and the present impracticability of demonstrating that the milk of any cow is free therefrom renders this source of contamination highly interesting. It has been further shown by our researches that such infection occurs. This we have traced with fidelity from the heifer calf at twenty days up to the time that she aborts during her first pregnancy. No other readily acceptable explanation is forthcoming for this persistent infection. Some contend that the infection does not endure for so long, but in our experiment animal Number 34 the severe infection has existed for four years and has only reached its climax. How much longer it may continue, if the animal survives, is merely a guess.

Our experiments in the growing of calves have shed further light upon the method by which the invasion occurs. We have shown that we can change profoundly the character of a calf by the feeding. If we feed one new-born calf, sound at birth, from the very beginning upon boiled milk and another calf, also sound at birth, upon raw milk, the two calves present very marked differences. The calf grown upon the boiled milk retains clean sexual hairs, while that grown upon raw milk has its sexual hairs stained and matted together very early in its existence. The blood of calves which have clean sexual hairs does not, so far as we have been able to determine, react to the tests for contagious abortion, whereas the blood of those calves whose sexual hairs are soiled and matted reacts largely to the agglutination and complement-fixation tests. These differences have not been carefully

investigated and require much study. They have been very largely ignored by most investigators, but a superficial study of these differences should convince the most skeptical of the presence of an actual difference and should incite some study and attention thereto. What that difference is and what it signifies to the breeder and to the sanitarian who believes in clean milk, we do not yet know.

There is no cure for abortion and no means at present by which it can be completely eradicated from a herd. Four years ago, I cited an experiment with the eighteen heifers mentioned above, upon which bacterins had been used. My experiment indicated with great emphasis that bacterins had no value. Bacterins have now been quite universally rejected. They are still sold, but no establishment of high repute is vigorously recommending their use.

Methylene blue was being highly recommended in 1912, and was used very liberally. The cows, the milk, the stables, and to a considerable degree the owners were made blue, but it neither cured nor prevented abortion.

Just at present there is considerable interest in a new plan—the hyperinfection with the abortion bacillus of already infected animals prior to impregnation. The British Royal Commission has suggested this. Under their general plan, Mr. Bland, the Agricultural Organizer for Oxford County, England, has presented some interetsing data which tend to arouse the hope that the plan may prove efficient as a preventive.

One of the most significant items in their data is that regarding a group of 140 cows which had previously aborted. After these were inoculated experimentally with large volumes of highly virulent cultures, they proceeded to abort a second time in higher ratio than cows which had not aborted previously. It must be admitted that the previous abortion was caused by an intense degree of infection. To this was added the large volume of virulent cultures which the experimenters used. Yet the animals aborted more freely than the cows which had not aborted previously. In addition, a very large percentage were sterile or aborted unseen. If the theory of hyperinfection as a preventive is correct, the cows which had aborted previously should, with the addition of yet more infection, be most free from future abortions, but the reverse proved true. This is in harmony with all published ob-

servations. Wherever a cow has aborted once, she is more liable to abort again than is another cow of the same age and under the same conditions which has not suffered from abortion, sterility, or metritis.

Readjusted in harmony with the researches for the past four years, my views regarding the source of the infection and its avenue of invasion may be outlined as follows:

(1) The largest known volume of the infection accumulates in the gravid uterus and is very largely expelled prior to, during, and soon after the termination of pregnancy.

(2) Less in volume than in the uterus, but more frequently recognizable by present methods, is the infection in the milk.

(3) The infection may and does pass through the chorion from the utero-chorionic space, penetrates the amniotic cavity, and is swallowed by the fetus. It may cause fetal diarrhea or may be lodged in the meconium ready to cause white scours or later pneumonia, in the new-born calf. Most calves are born free from the infection.

(4) Infection-free new-born calves generally or always ingest the infection with their milk, either from the interior of the udder or from the exterior of the teat, which has been soiled from the discharge from the genital tract. The latter source is far more dangerous. If the dam or nurse cow is not severely infected, the calf thrives well and presents no evidences of disease: its blood does not react, or reacts very low. If the cow is ill from metritis or retained afterbirth, the intense infection of the calf after birth, as well as before, is more probable, and the severity of the infection tends to be greatly increased. The infection is intensified, especially in dairies, by the use as calf food of unmarketable milk from badly diseased cows. The intensity of the infection is greatly heightened and assured through the feeding of mixed, or composite milk, by which the calf is exposed to the most virulent infection in the herd, and still more injuriously when it is fed upon raw skimmed milk and whey from creameries and cheese factories, by which means each calf is exposed to the most virulent strains of the abortion bacillus in the community. It is this exposure which is chiefly responsible for the constant increase in virulence of the disease in dairies, in contrast with the lesser frequency in beef cattle, where the calf is exposed usually to the milk infection of its dam only.

(5) The cohabitation of evidently diseased with apparently sound cows; intermediary bearers, such as attendants and visitors; and the contamination of the food of adult cattle play a minor role in the dissemination of the disease.

(6) The bull plays an important role. Definite experimental proof of this is wanting and the clinical evidence is contradictory. The bull must at least be a more probable carrier than an attendant. Logically, we cannot expect an infection of the genitalia to be unisexual. The bull would naturally tend to be less seriously involved than the cow, and his blood generally reacts more feebly than that of the cow.

(7) An abortion storm may be aroused in a herd intrinsically through unfavorable conditions within the herd or extrinsically through the introduction of new cattle of either sex from herds having a more highly virulent type of infection.

These views regarding the source and course of the abortion infection inevitably clash with the old, and still generally held idea of the efficiency of the isolation of aborters in the control of the disease. In my clinical experience handling sterile cows, the frequency with which I find a dead embryonic sac lying in the vagina or in the cervical canal and other evidences of a most convincing kind teaches me that probably less than 50 per cent. of the actual abortions are seen. Just how anyone can bring himself to believe that isolating 50 per cent. of the aborters from a herd will eliminate the disease, I cannot understand.

Again, I find a necrotic mass of fetal membranes protruding into the vagina through the cervical canal, and all about it a voluminous discharge taking place. The anterior portions of the fetal sac and the fetus are alive. The discharge from the cervix has evidently existed for weeks. There are no exterior signs of abortion and no rule for isolation. The animal is not known to be an aborter. Finally she aborts a tiny fetus in its membranes, and the uterus is at once well nigh clean. Now comes isolation—if the abortion is discovered, which occurs in less than one per cent. of such cases. The cow is cleaner and safer than she had been for weeks. I do not understand how isolation, after most of the infection has been discharged, can control the disease.

Sometimes I find a cow carrying a fetal cadaver for one or two years, fetal debris and uterine discharges all the while escaping without attracting attention. She has not aborted; she is in

no danger of aborting. She would be more fortunate if she could abort. The isolation scheme does not demand her segregation.

I see cows which carry their calves to full term and expel them alive. For some time prior to calving, they expel pints, quarts, literally gallons of the typical exudate of contagious abortion, but they do not abort. Still, they expel more abortion exudate than twenty cows which abort in early pregnancy. These cows have not aborted and are not subject to quarantine.

Sometimes I see a cow calving prematurely or at full time. Because of the metritis of contagious abortion, she has retained placenta and between the membranes and uterus a great mass of the typical exudate of contagious abortion. Her failure to abort leaves her in the herd, discharging far more virus than most aborters. Her live calf is infected at birth and soon has the dysentery or pneumonia of contagious abortion. Quite naturally, the calf has not aborted or been aborted, and under the rules is not subject to quarantine, but it spreads disease and disaster in the calf stable. From such cases down to the point where acceptable evidence of infection vanishes, is every gradation. The sanitarian who would control contagious abortion by isolation places himself at once between the Scylla of attempting control by removing a pitiable minority of dangerous animals and the Charybdis of practically or completely emptying the stable. The futile process of isolating aborters to control abortion has been the cornerstone in the handling of this scourge for at least fifty years, and the results are so evident to-day that one may well wonder why the plan is still advocated by anybody.

Instead of the isolation of aborters, I have advocated for some years a plan of control based upon the conception, outlined above, of the disease.

(1) Guard and protect the new-born calf. Bathe and disinfect the cow before calving and place her in a clean stall. Remove the calf immediately after birth. Cleanse and disinfect the udder and neighboring parts before permitting the calf to suck or drawing milk for it. Keep the calf upon the raw whole milk of the dam or of a selected cow for eight to ten days, and thereafter feed upon sterilized milk, which may be skimmed, mixed, etc. This limits the milk exposure to that from one cow and to the first eight or ten days of the life of the calf.

Keep the calf isolated as long as practicable. If it develops

scours or pneumonia, proceed vigorously to cure it at once, if curable or worth curing; if incurable or not worth curing, kill it and dispose of the cadaver as a menace to the herd.

When the calf reaches breeding age, mate heifers with healthy bulls grown in the same manner. Before breeding, cleanse the genitalia of both sexes as carefully as practicable.

(2) When metritis exists and causes sterility, abortion, premature birth, or retained afterbirth, cure the metritis—cure it promptly and well—or send the cow to the butcher. Examine the genitalia of all suspicious cows often enough to keep track of the pathological conditions present. If the disease of the genitalia (ovaries, oviducts, or uterus) is incurable, slaughter the cow; if curable, cure her. Do not permit the herd bull to serve a cow which can not at that time conceive. Copulation intensifies the infection in the cow and imperils the health of the bull.

(3) Protect the bull by douching the external genitalia regularly before and after service.

(4) Do not introduce into a herd, except when absolutely necessary, new animals of either sex which may bring into the herd a more virulent strain of infection than that already present. In other words, keep no dangerously infected cattle of either sex or of any age in the herd. If they become diseased, cure them promptly or kill them as a menace to the herd.

In 1912, we referred to a dairy designated as Herd B. Some interesting things have since occurred in that herd.

In 1912 the management, thoroughly disgusted with the losses from white scours and pneumonia in calves and the abortion and allied complications in heifers pregnant for the first time, sold all unbred heifers and heifer calves, and began anew the effort to grow heifer calves with which to replenish the herd. Previously they had handled their calving cows in the usual manner. They had taken them out of the milking barn, and placed them in box stalls where they were fed and watered. When they had calved, the calf was left with the cow for a few days and allowed to suck at will. Then it was removed to a large calf barn, where it was placed with many other calves and fed upon mixed pasteurized milk.

Then they changed their plan. Before the cows calved, each was given a thorough bath with soap, water, and a disinfectant. She was then placed in a carefully cleaned and freshly bedded

CHART III.

Calf Scours and Pneumonia, and Abortion and Sterility in Herd B.

Time Covered	Heifer Calves Born		Died of Scours and Pneumonia	Sold as Sterile	Killed account Tuberculosis	Miscellaneous Deaths	Sold for Veal	Conceived	Pregnancy terminated		In Herd Pregnant	In Herd not Bred
									Calved	Aborted		
May 1. 1909 to Aug. 31. 1912	593	no	184	8	56	57	118	170	95	75	0	0
40 Months		%	31	1.4	9.4	9.6	19.9	27.8	55.9	44.1	0	0
Sept. 1. 1912 to Oct. 31. 1916	904	no	203	6	13	58	0	382	203	22	157	245
50 Months		%	22.4	0.6	1.3	6.4	0	44.2	90.2	9.8	17.4	27

box stall and care was taken to keep her moderately clean about the buttocks, tail, and udder. The calf nursed ten days, and was then placed in the calf stable and fed somewhat more carefully than before. The milk was more carefully pasteurized. The mortality in the new-born calves was lowered from 31 to 22.4 per cent.—an improvement of 8.6 per cent. in the total number of heifer calves born and a diminution of the mortality from calf scours and pneumonia of 28 per cent. A parallel diminution in miscellaneous deaths followed promptly. Tuberculosis in heifers decreased markedly, but other causes were affecting this problem and involving a general decrease in tuberculosis in the herd.

When the heifer calves grown under the amended plan reached breeding age, a very marked change was apparent. They conceived more uniformly and far more promptly. The plan in each group was to breed at fifteen months and have them calve at twenty-four months. Temporary sterility in the first group delayed the average termination of pregnancy three months, or until the heifer was twenty-eight months old; in the second group the average age at calving has been twenty-five months, while permanent sterility has almost vanished.

When the pregnancies began to terminate, the contrast between the two groups deepened. In the first group the calving rate was 55.9 per cent. against 90.2 per cent. in the second group; the abortion rate in the first group was 44.1 per cent. to 9.8 per cent. in the second group. Lack of time forbids details, but throughout the seven years covered by the data there has been a surprising harmony between the mortality from calf scours and pneumonia during the first ten to fifteen days of life and the rate of abortion when the surviving heifer calves become pregnant. The harmony has not been limited to the one phenomenon. The scours and pneumonia inevitably laid the foundation for some of the mortality classed as miscellaneous. Accordingly, once the scours mortality is reduced, although scours is only partly due to the abortion bacillus, the entire symptom-complex of the disease—sterility, abortion, metritis, and retained fetal membranes—is favorably affected.

A close study of the subject up to the present time reveals no other explanation for this remarkable change in the abortion rate of Herd B. It is not one of those unexplainable depressions in the abortion rate in the herd. If it were, the drop in the abortion

rate would include the adults, which it does not. During the period of the first group, the abortion rate was 44.1 per cent. in the first pregnancies and 16. per cent. in the third or later pregnancies, while in the second group the abortion rate in first pregnancy was 9.8 per cent. against 12.2 per cent. in adults. The ratio between abortion in heifers and in adults has been reversed. The two groups of heifers have been kept in the same stables, paddocks, and pastures; cared for in the same manner by the same group of attendants (of constantly shifting personnel); fed upon the same character of food from the same sources; watered the same; and when four to seven months pregnant are placed in the same stables with the original herd, where abortion has always prevailed. As they were not milked, the danger from infection through the udder needs be regarded as of minor importance, with no difference of exposure between the two groups. The bulls used for the two groups were in general the same, except that some of them were grown with the heifers in the same manner, which merely reverts to the calf feeding as in the heifer calves.

Search as one may, the only explanation appearing is the change in the care of the new-born calf, and what is more interesting and withal highly suggestive in the problem of the production of clean milk is that the principal effect of the change is not upon the milk within the udder, but upon the contamination from the exterior of the udder. The data suggest that the genital discharges flowing down over the udder and teats and sucked in with the milk by the calf contsitute a very serious menace to the life and health of the calf, tending to cause scours and pneumonia early in life, and that, if the animal survives this ordeal, the infection persists, to awaken the whole symptom-complex of contagious abortion when the heifer reaches breeding age. Yet it is neither unreasonable nor strange. In cases of retained fetal membranes, a bacteriological search of the placental structures and of the meconium of the new-born calf, according to the researches of my colleagues Fitch and Hagan, tend to give identical findings. Sometimes the fetus suffers from the scours. If the intra-uterine infection can pass through the chorion into the amniotic fluid, be swallowed by the fetus and cause fetal diarrhea or be held in store until after birth, to cause calf scours, surely that same virulent infection flowing down the escutcheon, thigh, and tail onto the udder and teats, where the calf must inevitably swallow it with its first mouthful of milk, must be a serious peril.

Theories upon the source, avenue, and era of infection of contagious abortion are many, conflicting, and confusing. What the breeder and dairyman desire most is not theory, but definite constructive work in the dairy itself. The data upon the fifteen hundred heifer calves in Herd B, following them through their first pregnancy, constitute the cleanest cut, most comprehensive, and most encouraging chapter ever recorded in the battle against contagious abortion in cattle. These data cannot well be ascribed to chance or overthrown by elaborate theories. The only thing which can or will affect them in the least is a clear, logical explanation other than that offered for the difference in the two groups of heifers.

LABORATORY MILK AND MEAT INSPECTION*

DR. J. F. MITCHELL, Anaconda, Mont.

The number of diseases that it is possible for people to contract from milk is large, for be it remembered that not only those diseases from which both cattle and man suffer are included, but also the human diseases that can be spread to other human beings by means of milk and water. These diseases in the order of their importance include the following: infantile dysentery, typhoid fever, tuberculosis, diphtheria, scarlet fever, septic sore throat or pseudo-diphtheria, scarlatina, Malta fever (goat's milk), milk sickness or para-typhoid. It is possible to contract many other diseases from milk, among which are the following: foot and mouth disease, pus infections, verminous troubles, smallpox, syphilis (a friend of mine told me of a case in which he found a dirty syphilitic man milking), contagious abortion, anthrax.

The number of these possible diseases could be increased very greatly.

The main avenues by which milk becomes infected are the following:

> From the udder of the cow; here the milk picks up only a very few of the germs we find later in our bottles. Tuberculosis, pus infection and Malta fever are the main ones.

*Presented at the meeting of the Montana Veterinary Medical Association, January 6, 1917, Missoula, Mont.

> From dirt on the cow's sides, loose hair, and stable air are collected tuberculosis and pus organisms.
>
> From the hands and clothes of the milker can come any of the human diseases—tuberculosis, typhoid fever, diphtheria, etc.
>
> Dirty bottles, dirty cans, and filthy wash water supplies are all important factors and to every one have been credited typhoid outbreaks.
>
> In the distributing depots we come in contact with the same dirty utensils and human agencies again.

One of the most flagrant sources of typhoid infected milk has been the wash water supply of the dairies. Fifty-four epidemics have been traced to this source alone. Only one other source of infection has so great a number and that is, epidemics caused by milkers or dairy attendants who are actually attending to milk directly or indirectly when they have the typhoid fever.

Milk is an ideal medium for germ propagation; while milk in the cow's udder is rarely sterile, still this source of infection is insignificant in comparison with outside contaminations. When milk is once contaminated, there is no practical way of getting the germs out again; all we can hope for is to decrease their rate of multiplication by keeping the milk cool, or by pasteurization to decrease their numbers, followed by cold.

The history of one outbreak of milk-borne typhoid fever will illustrate what sometimes happens:

"ELKTON EPIDEMIC: Elkton, Maryland, had a population of 2,542. The town water supply was obtained from Elk River about 1½ miles above the town. Part of the families drank the town water, the rest used private wells. The inhabitants were supplied with milk from 4 dairy farms having routes in the town. Dairyman B, on his way to town each day with his own milk obtained an additional amount from 2 other farmers, C. and D., both of whose farms remained free from typhoid. In September 1900, a case of typhoid fever occurred on farm A. adjoining farm B. Mrs B., wife of the dairyman, assisted in nursing the case at A. for two or three weeks up to October 5th. For some days before this Mrs. B. and one of her sons had been ailing, but the boy continued milking and the mother handled the milk up to October 8th, when both became too ill to work. (Later another son fell ill.) Previous to this time, there had been in Elkton only 3 cases of typhoid and they were all in one family, occurring August 12th, September 12th and September 19th. On October 11th, 3 cases of typhoid fever were reported; 12th, 1 case; 13th, 2 cases; 14th, 3 cases; 15th, 3 cases; 16th, 3 cases; 18th, 6 cases. By October 28th, 32 families had been invaded. All used milk supplied by B., 18 used the town

water supply and 14 private wells. The total number of cases was 39. On this day B. stopped selling milk and in three weeks the epidemic subsided. The final summary of the outbreak was:

"Invaded houses 39; all used B's milk, 21 used public water supply, and 18 used private wells. B. claimed to supply regularly 80 houses with milk. One hundred and eighty people lived in the 39 invaded households.

"There were several occurrences during this outbreak of special interest. Miss M., living in New Jersey, visited Elkton for two days, October 5th and 6th, returning home on the 7th. While in Elkton she was at a house supplied with milk from B's farm. No typhoid had occurred at this house up to that time. On October 14th Miss M. fell ill with typhoid. In one family a negro servant, whose chief food consisted of oatmeal and milk, left Elkton the middle of October and went to Glasgow, Del., where she became ill of typhoid and died. In another family was a married daughter who left Elkton the last of October to visit friends. In about ten days she fell ill with typhoid. At the jail there were from 15 to 20 prisoners who received no milk whatever, 3 members of the jailer's family, and 2 men assisting about the place, all of whom used B's milk in one form or another, fell ill with typhoid, while the prisoners were not attacked."

In all milk-borne outbreaks, the disease follows the dairyman's route. It is usually of an explosive character; that is, a number of cases develop at approximately the same time, because relatively speaking, an infectious disease develops in all people in the same length of time.

Milk drinkers are more affected than other members of a family (this usually means children, invalids and women).

All of our Board of Health records should show the relation of contagious diseases to milk routes, whether they are supplied or not.

In Bulletin 54, put out by the Public Health and Marine Hospital Service, published 1907, there is a series of tables which give a number of milk-borne epidemics that have been directly traced to milk:

"MILK-BORNE EPIDEMICS"

Disease	Number of outbreaks	Number of cases	Number of deaths
Typhoid fever......	188	10,848	926
Diphtheria........	28	1,456	386
Scarlet fever.......	51	2,095	7
Sore throat or pseudo-diphtheria.	7	333	...
Scarlatina..........	23	1,142	270

Two of the most widely distributed milk-borne diseases are not included in these tables—tuberculosis and infantile dysentery.

The separation of the cases of bovine from human tuberculosis is neither easy or absolutely exact. Park and Kumvide have made a table of more than a thousand cases in which 10% of all cases of tuberculosis are traced to the bovine type. 26% of the cases between 1 and 16 years are bovine. Tuberculosis is probably the most widely spread of cattle diseases. It could almost certainly be detected in the milk supply of any of our cities. The tuberculin test and pasteurization are our greatest safeguards. A rigid physical examination of many tubercular cows and some dangerous spreaders of this disease will not always reveal the culprit. In England for some years samples of the milk of tuberculous cattle were injected into guinea pigs in order to find out whether the animal was passing tubercular bacilli with her milk. A guinea pig will develop tuberculosis in from four to six weeks following such an injection. Four to six weeks, however, is a long time to deprive a dairyman of a cow's milk, or to drink such milk if it be tubercular. And, when one adds that the test is not infallible, that the guinea pigs often die of other diseases and that a cow may become dangerous at any time, the test is very unsatisfactory. I know of no quick satisfactory way of telling whether or not a sample of milk contains tubercular bacilli.

The largest single factor in the death of children under one year of age is gastro enteritis. This is largely due to improper feeding and dirty milk. The number of lives that Mr. Nathan Strauss has saved and will continue to save for New York City is very great. This has been brought about by establishing in that city depots where mothers can get clean pasteurized milk, modified according to a physician's prescription, with a result that the death rate was reduced 47% in children during the hot summer months, according to an article I read in October. Strauss depots during the first half of 1907 distributed 2,917,336 bottles and 1,222,045 glasses of milk. Twenty-two large cities in this country have infant milk depots (1907); their number is increasing. For adults the dangers of drinking badly infected milk is comparatively slight, but for children and invalids, they are very great indeed. The means by which a city may protect itself from contaminated milk are not as efficient as one would hope for. A thorough, careful, conscientious inspection of dairies, followed

by laboratory analysis of the product, with the co-operation of the dairyman, does not always prevent epidemics. Walking typhoid carriers and diphtheria cases cannot easily be diagnosed. However, such inspection certainly helps to give us what we all want—a pure milk supply at a reasonable cost.

There are two main methods for the analysis of milk. I will divide them into the chemical and bacteriological. In the chemical analysis the things ordinarily looked into are: butter fat content, total solids, presence of water and of preservatives (boric acid and formalin) and the acid content. In the bacteriological analysis: the number of bacteria per cubic centimeter, dirt content, temperature, and the age at time of delivery.

The particular varieties of germs in milk are not often taken into account. However, the presence or absence of the *B. coli* group of organisms is fairly easy to establish, and upon it rests the likelihood of typhoid infection. Some of the specific causes of other diseases can be found by cultures on different kinds of media or by animal inoculation.

I have made an estimate of the laboratory equipment necessary for a small city. In taking this matter up, I am figuring that bi-monthly examinations are sufficient; that all counts be made after 48 hours incubation; that in the larger towns the samples be collected for the analyist.

With the following equipment I feel very sure that I could do well the routine laboratory analysis necessary for Anaconda, and by adding more pipets, Petri dishes, media and an electric driven centrifuge ($75) one could do the work of any town in the state. This work would take about one-fourth of a man's time, figuring he can catch one-third of the milkmen at a time. A person would have to spend 6 days getting the samples and making the analysis. Any trip to the dairy plants would be aside from this.

These analyses would cover the following: bacterial count; age; dirt content; temperature; specific gravity; presence or absence of water; butter fat content; acid content; chemical tests for boric acid and formalin.

Of course, where a dairy is running a high count and it is necessary to take samples from all utensils and all the cows, the local man might need help from the central state laboratory. In case of a severe epidemic of any of the milk or water-borne disease, he certainly would need help.

The amount of time an inspector would have to spend inspecting dairies, I know very little about, for although I have done this work for other men, I have never officially had charge of that end of milk inspection.

LABORATORY EQUIPMENT NECESSARY FOR A SMALL CITY

Bacteriological Equipment:

Incubator (Arthur H. Thomas Phil. No. 3 9x9x12)	$20.00
Hot air sterilizer (No. 1128 Spencer Lens Co.)	15.00
Petri dishes @ 30 2 doz. No. 1586 (Spencer Lens Co.)	7.20
1 c.c. pipets @ 8 2 doz. B. & L. 15956	1.90
Thermometer 1 16950 B. & L. 0-360	1.80
Media agar 4 doz. tubes (1 month's supply)	3.00
Sediment tester (The Creamery Package Mfg. Co.)	3.50
Alcohol stove (Sparrow's Drug Store)	.25
Alcohol for lamp, 1 gal	.75
	$53.40

Chemical Equipment:

Centrifuge (Argos 6 bottles hand power 15736 B. & H.)	$9.00
(An electric driven centrifuge costs from $45 to $75)	
Milk bottles, 1 doz., (I. I. C. Co.)	1.00
Cream bottles ½ doz., (I. I. C. Co.)	1.00
Skim milk bottles .. doz., (I. I. C. Co.)	1.80
15 c.c. graduated tube, ½ doz., (I. I. C. Co.)	1.00
Milk pipets, ½ doz., (I. I. C. Co.)	1.00
Cream pipets, ½ doz., (I. I. C. Co.)	1.00
Lactometer (new design) 15730 B. & L.	1.00
Buret 1568 (Spencer Lens Co.) 50 c.c.	1.00
Phenolphthalein 1 oz., B. & L.	.25
1-10th normal sodium hydroxide 1 liter	1.00
Hydrochloric acid B. & L., 1 lb	.15
Test tubes, regular 1922 16x120 mms. B. & L.	1.35
	$20.50
Grand total	$73.95

The incubator in this outfit may be omitted if the Petri dishes are held 5 days at room temperature before being counted.

The cost of inspections for the certified dairies supplying San Francisco, Oakland, Alameda, Berkeley, and some smaller towns, are borne by the dairymen themselves. They pay $5.00 for two bacterial counts, $5.00 for two chemical analyses, and $10.00 for a dairy inspection per month. I used to make the bacterial counts for these dairies; there was a good deal of profit in it. What pro-

portion of an inspector's salary should be paid by the dairies themselves, is, of course, problematical; certainly some of it should in one form or another. A fair fee for a complete analysis where there are a number to be made regularly would be $2.50 per sample, transportation expenses being allowed. I have on the table here, the equipment (or cuts of it) that I consider necessary, and also some Petri dishes showing colonies of bacteria; the milk corresponds to the grades of certified, pasteurized and regular market milk. Later I will be glad to demonstrate these to anyone interested.

The standards that a city should require of a milk supply are problematical. They would depend on the size of the place, season of the year, age of the milk, etc. The state has a standard for butter fat, total solids, etc. It seems best to follow the state laws as the enforcement of city ordinances where they conflict with those of the state has not been very successful in California.

The following are the bacterial standards put out by New York State (1907):

Certified milk.............	10,000 per c.c. or less
Inspected milk............	25,000 per c.c. or less
Market milk, in winter....	100,000 per c.c. or less
Market milk, in summer...	1,000,000 per c.c. or less
Pasteurized milk..........	500 per c.c. or less

The bacterial content of milk is sometimes obtained by taking a definite quantity, diluting it a definite number of times, spreading a certain thickness of the result on slides, and then staining with methylene blue and counting with a microscope. The results are just fairly satisfactory. One reason that these counts do not seem to compare with the bacterial plate method is that one counts not only the germs that would grow on the plates, but also many germs which do not grow under these conditions, together with dead germs. Therefore, microscopical analysis gives you a higher number of bacteria per c.c. than the plate methods. The regular method of obtaining the bacterial content by the plate method is the following:

To 100 c.c. of distilled sterile water are added 1 c.c. (16 drops) of milk to be examined. This is shaken 25 times to thoroughly mix the milk and water. 1 c.c. of this diluted milk is then added to a Petri dish, half a c.c. to another Petri dish, and 2 c.c. to a third. Agar culture media is then poured into the dish and let

harden. These plates are then incubated at blood temperatures for 48 hours. Each germ is supposed to grow and these germs form colonies of such tremendous number that the individual colonies can be seen and counted with the naked eye. Some of these plates are on exhibition on the side table. The rate of bacterial multiplication is stupendous. From one typhoid germ dividing once every 15 minutes, which is the normal rate for their reproduction, 39,525,722,084,154,878,141,463,175,168 develop in 24 hours. A germ varies anywhere from a circular globule ½ of 1-25000th of an inch across to one that might be 15-25000ths of an inch across.

The pasteurization of milk is advocated by many people because it insures greater safety to milk consumers. By pasteurization of milk is meant the heating of it to such a point that the bacterial count is greatly reduced, followed by rapidly cooling the milk. Pasteurization protects the consumer from milk carrying tuberculosis, diphtheria, scarlet fever, typhoid fever, etc., and so reduces the numbers of ordinary bacteria that infantile intestinal diseases are greatly reduced in numbers. While doing this, it increases the keeping qualities of milk. To offset these advantages, pasteurization increases the cost, perhaps decreases the digestibility and promotes carelessness in handling. The advantages certainly offset the disadvantages. Although the gross number of bacteria is very important, especially to children and invalids, the kind of bacteria is more important. If a few of the small number of bacteria in certified milk were typhoid germs, the danger in such milk is much greater than in milk with a million germs to the cubic centimeter provided the latter has no specific disease germs. For this reason pasteurization of certified milk is advocated by some people. Very dirty milk should not be pasteurized because it improves its keeping qualities, and thus enables the dealer to sell it. One other advantage in pasteurization is that in most plants, it enables the milk to be clarified at a very small additional cost. Any one who has seen the slime and filth that accumulates in a separator or clarifier bowl will appreciate that this is something that really should be done. I have seen a good many people after once having caught sight of such a mass of filth, swear off the drinking of milk forever and aye.

There are two processes of pasteurization: The "flash" or instantaneous process and the holder process. In the "flash"

process the milk is heated to 160 to 165 degrees F. for from one-half to one minute, then cooled immediately and bottled. This process is, on the whole, unsatisfactory, because to heat milk to this temperature, the medium by which this is done, is so hot as to cook part of the milk, while it is possible at least, if not actually probable, that some of the milk never reaches the pasteurization temperature. Cooking milk decreases the digestibility, injures the taste and the cream line, thus injuring the selling qualities.

In the holder process, milk is heated to 140 to 145 degrees F. and held at that temperature for thirty minutes, then cooled and bottled. Some plants heat their milk to 155 or even 160 degrees. If this process is properly carried out, pasteurization is complete. The milk retains its normal taste, digestibility and cream line. The holding of milk at 145 degrees F. is sometimes done in big vats, sometimes the whole process is carried out in bottles similar to the way beer is treated. In the bottle method the bottles are filled, capped, and then heated to the desired temperature, and later cooled. This is probably the most efficient way of pasteurizing milk, for in doing this, one cuts out the bacteria that get into milk during the bottling process and those in non-sterile bottles—not an inconsiderable number. However, this is the most costly of all processes. One way of reducing the cost is to bottle the milk hot and cool it in the bottles.

There are on the market a great number of pasteurizers that can be used in the holding process. These cost anywhere from a couple of dollars to several thousands. In the simplest ones, milk is heated on the stove in some sort of a double bottom container, then cooled by placing this container in running water. A small commercial pasteurizer of about 30 gallons capacity can be purchased for about \$70. This consists of a little boiler to furnish steam and a starter can for heating and cooling milk. A starter can is a double jacketed affair between the walls of which hot water and later cold water can be circulated, with some sort of an agitator inside to mix the milk during the process of pasteurization. In some of the more complicated machines, the milk is heated by a revolving hollow tube placed in some sort of a vat. Through this tube is first passed hot water and later cold water and brine. A machine of 200 gallons capacity can be purchased for \$350, not including the boiler or the bottling machine. The capacity of this machine can be doubled by running the milk in

the tank over one of the many milk coolers that are on the market instead of holding it in the original vat to cool. Such a cooler would cost $35 to $75. A complicated machine which consists of a milk clarifier (a centrifugal machine that filters the milk and removes all dirt), a pasteurizer which automatically heats the milk to 140 to 145 degrees F., a holder tank of 5 sections which automatically holds milk for 30 minutes a section, a cooler that cools the milk to 45 or 50 degrees F. and a bottling machine, capacity 60 quarts a minute, which automatically fills and caps the bottles, costs $2200. This does not include the boiler. They have such a plant in Anaconda and it does do the work.

I have with me several bulletins put out by the U. S. government and catalogues from dairy supply houses which, of course, go more thoroughly in detail about these machines. I will be glad to show them to anyone interested.

The relation of the laboratory to meat inspection is not nearly so close or so important as to milk inspection. Practically all meat is passed or condemned by macroscopic not microscopic inspection. However, where an inspector is not sure of his diagnosis, or where an owner is not satisfied with the inspector's diagnosis, they both have recourse to a laboratory. Here sections of the diseased parts are taken; these are usually cut into very thin slices, about 10-25000ths of an inch thick, placed on glass slides and stained to bring out the abnormal qualities and examined with a microscope. Some diagnoses can be made, for instance trichinosis in pork, by simply taking a portion of the diseased diaphragm and crushing between two glass slides and looking at it with the microscope, with or without staining. A few definite diagnoses can be made by simply smearing some of the discharge from a lesion upon a slide, then staining, after which, by the aid of a microscope, the cause can be found, as for instance the ray fungus, the cause of lump jaw in cattle.

The necessary apparatus to do this work is expensive and unless it could be used for all Board of Health work would not be justified in a small town. When once fitted up, however, such a laboratory would be capable of doing sputum, typhoid, diphtheria, stool, tumors, and similar work for the medical and veterinary practitioners in town.

MEAT INSPECTION LABORATORY APPARATUS

Microscope B. H. 8	$70.00
Mechanical stage, Model B, B. & L.	16.00
Table microtome 3050 B. & L.	12.50
Ether or rhigolene freezing attachment 3080 B. & L.	8.00
Section knife 3120 B. & L.	3.50
Black strop, coarse 3164 B. & L.	2.00
Black strop, fine 3168 B. & L.	2.00
Yellow Belgian hone 3182 B. & L.	1.50
Blue green hone 3186 B. & L.	1.00
Miller's water paraffin bath B. & L. 3206	15.00
Paraffin 2 lbs 43 degrees C.	.30
Paraffin 2 lbs 54 degrees C.	.36
95% alcohol 2 gal.	6.00
Absolute alcohol 3 lbs.	4.05
Alcohol lamp 8 oz. 3218	.20
Formaldehyde 40% 2 lbs.	.40
Bealser's copper 12480 250 c.c. and 1000 c.c.	1.95
Stains Fuchsin 10 gram	.25
Stains Eosin A. G. 10 gram	.35
Haemotoxylin, chem. pure cryst. 10 gr.	.65
Methylene blue (Koch) 10 grs.	.30
Box of cover glasses	1.00
Bealser's nested 1-10 B. & L. 12490	2.80
Box of microscopic slides	2.00
Conical graduates 14944 1000 c.c.	1.80
Cylinder graduates 13622 100 c.c.	.60
Cylinder graduates 13622 25 c.c.	.35
	$147.86

There are a good many things that would be useful that are not listed above, but the essentials, I think, are there. If you add this equipment to my first lot, the cost is $221.81. The result would be a better laboratory, capable of doing a greater variety of work than is found in most hospitals.

—The Ontario Veterinary College has the record for sending the largest number of its graduates into the Army Veterinary Service. About 200 men are at the front or on their way, and requests are coming in for more "men who know something about horses."

FOOT WOUNDS*

A. L. DANFORTH, Watertown, N. Y.

The request of our secretary for a paper on some practical subject gave me, I will admit, a wide field from which to choose. Probably nothing new will be offered in the line of treatment of foot wounds, but it occurred to me that this together with the discussion following, might be of interest to those of us at least who are in general practice in the larger towns.

Nature has splendidly equipped the feet of the horse as well as the cow with a tough, horny covering, and in the horse man has for centuries further protected these with shoes of various styles and shapes, and, I might add, applied with various degrees of skill, although I have no intention of dwelling upon the subject of shoeing. Regardless of this protection afforded by both Nature and man, there is no part of the horse's anatomy which is so liable to injury and which causes the horse so much suffering as his feet.

For the sake of convenience we will roughly divide these anomalies into two classes; first, those chronic conditions caused by faulty conformation, bad shoeing and concussion, such as side bone, ring bone, laminitis, etc., and second, those acute injuries due to nail and calk wounds, corns, acute laminitis, wire cuts, etc., and we will devote most of our time in this paper to the ones last mentioned.

Probably a large majority of the injuries to the feet are caused by puncturing the non-sensitive and sensitive laminae by nails or similar objects such as bolts, screws, glass, etc., and the handling of these involves in many cases a great amount of patience and hard work, and if we do our work well we certainly earn our money. These wounds are in nearly every case badly infected, and many times have been left until all the home remedies, such as cow manure poultices, spirits of turpentine, soft soap, etc., have failed, and when we are called we find a badly infected wound which demands more or less radical treatment, varying of course with the extent of the wound and the intensity of the infection. By far the greatest number of nail punctures are located along the lateral clefts of the frog and in my experience the more anterior their lo-

*Presented at the meeting of the Central New York Veterinary Medical Association, November 16, 1916, Syracuse, N. Y.

cation, the more satisfactory their termination, the most troublesome ones being those near the base of the frog. In those cases where the sensitive laminae are only slightly injured and where attention is promptly given, we will have but little difficulty. Free opening with cauterization and a protective covering will usually suffice. But where the puncture is deep, injuring the os pedis or plantar cushion, where the infection is virulent and the wound has been neglected from one to several days, we will, of course, be guarded in our prognosis. These cases call for careful judgment and, in many cases, a great amount of hard work. The difficulty of attaining and maintaining asepsis, and often the intractability of the patient is experienced. I make it a practice to begin by removing the shoe and the entire outer surface, or, in other words, to shave off a layer of the entire sole and frog in every case where possible, and in this way the surface of the foot is cleared of all filth and dirt before the wound is explored at all. Then with a very sharp hoof knife we can follow the course of the wound through the horny layers, and if, on passing through the non-sensitive sole, we find it separated from the sensitive laminae and loose, I do not hesitate to remove all that portion which is undermined. This sometimes means the entire removal of the horny non-sensitive frog or perhaps half the sole, but if it is detached from the keratophyllus tissue to any great extent, I have found that the puncture has seldom penetrated any deeper, and by freely removing all of the loose sole or frog, we may, in most cases, look for a prompt and favorable termination, for regeneration of the horny covering progresses with remarkable rapidity. Where, however, the puncture has gone deeper into the tissues and the os pedis, tendon sheaths, or pedal joint is involved, the condition at once assumes grave proportions and our prognosis should be guarded. A sufficient amount of the non-sensitive covering should be removed to allow us to reach the most deeply affected parts with probe and curette. Here restraint becomes a question of importance, and where a table is not available, I believe the results will well repay our efforts if we take sufficient time to cast the animal and cocainize the wounded member, as it enables us to do our work much more thoroughly and with a greater degree of asepsis and, I might add, with far less danger to ourselves and patient. The operating table, however, is unquestionably the best means of handling severe cases. For a dressing, I am partial to some of the iodin preparations. When

not much pus is present I sprinkle the wound with iodin crystals and get them into the wound as deeply as possible, then holding the wad of absorbent cotton in readiness to quickly cover the wound I add a few drops of spirits of turpentine. The resultant explosion drives the fumes and intense heat into every recess of the cavity, and this seems also to greatly hasten the growth of horny tissue. Where much pus formation exists, however, the above treatment appears to form a coating or scab over the wound and retards drainage, and I like instead an application of ether, iodin or glycerine and iodin. I prefer to then cover the wound and in fact the entire foot with oakum instead of cotton, hold this in place with a bandage and then encase the entire dressing and foot in a well-scalded wheat bran poultice. I like bran for several reasons. It is easily obtainable, easily and quickly prepared, stays moist for a long time and will soften up and cool out an inflamed and brittle hoof as quickly as anything I have ever used, and when removed it does not adhere to the hoof and leave a sticky mess as does flaxseed and other preparations. I usually take the end of a No. 100 sack, cut it shield shaped, which allows the corners to wrap snugly around the pastern, and when properly tied with strong cord it is very seldom that a dressing will not stay in place 24 to 48 hours or even longer. And right here let me add for the benefit of the younger members, (I am getting old myself), that nothing will please a client more than to see a practitioner skillfully apply a dressing to a horse's foot, for it is something that very few laymen, even the very good horsemen, can do properly. An occasional saturating of the entire dressing with a solution of some disinfectant is advised until a redressing is needed, which may be in 24 hours or longer depending, of course, on the case, and it is very seldom that I leave a puncture wound for a caretaker or teamster to dress unless it is well on the road to recovery.

When lameness has subsided sufficiently that the animal may resume work, if there is very much of an open wound remaining, a piece of sheet iron or galvanized iron is cut the size of the shoe and punctured for nails corresponding to the holes in the shoe and this is used under the shoe as a protection to the tender part against further injury from bruising. I carry a piece of such material, tin shears and nails, etc. in my car and often apply them after dressing a nail wound in the country, for as a rule it allows you to provide more perfect drainage and the protection given the

wound by the iron covering enables the horse to resume work a few days sooner. I will not dwell upon the severe nail pricks which puncture the navicular joint and necessitate resection of the tendon, etc., for even if I could throw any light on them, which I doubt, they are a subject of sufficient magnitude to prohibit their discussion in this short paper. The above treatment will also apply to corns, only, in shoeing, the wall and sole of the affected quarter should, of course, be cut away sufficiently to provide frog pressure and relieve the pressure over the affected area.

Calk wounds occur most frequently in winter when the shoes are equipped with sharp calks and when the snow is deep. By far the greatest number of these are located around the region of the coronet and vary in severity from simple bruises to the opening of the coronary joint with resultant arthritis. The calk usually crowds down behind the wall or into the sensitive structure, infecting foreign material, as hair, dirt, etc., and lameness may develop at once, although as a rule lameness is most severe after an interval of three or four days, or when infection and inflammatory processes have progressed sufficiently to involve the surrounding structures. Hair should be clipped short and where the wall is loosened it should be carefully pared away with a very sharp knife until all filth and dirt can be reached and the horn below the point thinned with a rasp. Then, after thoroughly cleansing, if the wound is slight, an application of tar and oakum held in place by a bandage may suffice. But if the continuity of the skin or coronary band is badly broken, in which case lameness is usually severe, an application of ether iodin or glycerin and iodin and a liberal covering of absorbent cotton, held in place by bandages and kept thoroughly saturated with hot saline solution for two to five days without changing dressings, will in most cases be followed by a reduction in pain and lameness. I might also add that all paring of hoof around any wound should in my opinion be done by the veterinarian himself with clean, sharp instruments and should never be left for a blacksmith to do. I also believe it is mighty poor policy to send a horse to the shop with instructions to have a shoe fitted in some particular way without accompanying the horse to see that the shoe is applied as intended. I like to carry two hoof knives, one an ordinary blacksmith's knife to remove the outer surface and dirt and a fine double-edged knife for working around the wound and both should be kept sharp. Nothing will dissatisfy a client more quickly than

to see a veterinarian try to trim out a calk or nail wound with a rusty, dull knife, and the next case he is very apt to take to the blacksmith shop for treatment.

We all get our share of wire cuts and I shall have little to say about them except those which occur across the quarters where the wound is from above downward leaving a huge gaping wound with a flap hanging down. With these I have had exceptionally good results by taking a very sharp scalpel and, after washing thoroughly, shaving off a thin layer from both the flap and the side of the wound next to the foot. This seems to remove all infecting material and in reality makes a fresh wound. Then I draw the flap up holding it firmly there in an ample covering of absorbent cotton, keep it saturated with hot saline or antiseptic solution for four or five days without undressing and in most cases adhesion results when it is then treated openly. Even in some very angry and filthy wounds surprising results are obtained and only a small scar results. Where the lateral cartilage is severed, I try to remove the incised portion as it is next to impossible to obtain union between two segments of cartilage.

In speaking of laminitis, I will say a few words as I have nothing new in the line of treatment. I have not yet been able to find a specific and still use the old line of treatment, i. e., soaking in very hot and then very cold water, internally nitrate of potash, etc., and arecoline hypodermically. I have used the alum treatment in a few cases but so far have failed to see any decided benefit, certainly not enough to justify me in omitting the foot application which some writers have termed unnecessary. I do wish to say a word, though, about those cases of laminitis which result in a drop sole. These cases usually follow neglect on the part of the owner and seldom result when a case is treated in the early stages of laminitis. I shoe these cases always with a boiler plate or ball shoe or with a Corcoran shoe. Many of these hopeless cripples can be made serviceable by the application of one of the above-mentioned shoes. (Exhibit specimen). I remember one case in particular of a 1700 pound horse which was brought to a blacksmith for treatment. The smith wanted some advice before proceeding and I was called. The horse had had a severe attack of laminitis following an attack of acute indigestion for which he was treated by a quack. On examining the fore feet we found that the os pedis had dropped to such a degree that the soles were bleeding and the

horse had had great difficulty in coming in and wanted to lie down in the shop. We shod both fore feet with ball shoes and filled the cavity with hot tar and oakum. The horse walked home comfortably; the forefoot was placed in a weak solution of $CuSO_4$ for a couple of days. In three days the horse was ploughing and one week later I met the owner driving him on a brick pavement at a trot with scarcely any perceptible lameness. These were replaced when worn and in a couple months ordinary shoes were used.

Another case in a small mare used on a milk wagon had had a similar foot which had been treated by three different veterinarians for nearly a year. The owner was on the point of destroying her but decided to call one more man as there was a new one in town. We took her to the shop and a ball shoe was applied. She resumed work at once and in a few weeks her ordinary shoe was used and she is doing her work today and shows no lameness. I never got any pay for this job. This shoe is also very useful in incurable ringbone, and it is surprising how little they slip on an ordinary road or pavement. They do not hold so well on snow.

In closing I will say that in practically every case of a wound where there is a possibility of tetanic infection I administered a 500 unit dose of tetanus antitoxin.

VETERINARY CONDITIONS "OUT WEST"

E. T. Baker, D.V.M., Moscow, Idaho.

Many letters come to me from veterinarians in the east and middle west inquiring about the opportunities in the west. While our journals are full of scientific articles, research work and various other topics of a kindred nature, interesting to the profession in general, very few treat upon the subject of locations or business opportunities.

The young graduate often wonders what life holds in store for him, and unless he has the pull to land a good salaried position, he will not suffer from the gout the first or second years out of college.

The older man, located in a territory already over-run with practitioners, quacks, county agents, patent medicine vendors, tractors, jitneys and handy neighbors, looks around for better fields.

No matter how well a man may be equipped, mentally or physically, unless he has the business to do, he will not soon become a steady winter visitor to Palm Beach.

Then, there are many men who desire a change from a salaried position to that of private practice, or who are dissatisfied with the climate or other conditions in their present location. That the American nation is a nomadic one can be easily seen by spending a few hours in one of our great union stations.

The west has always been an attractive subject. The theatre has portrayed it as a country of unlimited opportunities. The "movies" have still furthered this idea, and the poor boy, leaving home with nothing but a mother's prayer and an extra pair of suspenders soon strikes it rich and they live happy ever after.

Some of my inquirers desire to go into the stock business. They have a few thousand dollars saved up and imagine they can soon treble or quadruple this wad. They forget the questions of range; wintering; marketing; diseases; poisons; predatory animals, and a thousand other obstacles. To dream of the warm sultry winters out in the northwest it is only necessary for me to state we have had over 115 days of sleighing, with over two feet of snow on the ground while I write this the first of March.

Let me take up some of the disadvantages first. First, one must get acquainted with clients. This requires time. The western people have had "hospitality" so worked on them they are getting somewhat chary of being so free with strangers. The rancher has had his fireside so often invaded by smiling real estate or mining stock salesmen that he looks long and carefully before he becomes friendly. His stock have been filled with bird shot by city hunters; his wire fences cut by unscrupulous fishermen and his pocketbook depleted by traveling bums of many and varied hue that it is not the free and easy west that was.

Then again, the old "vet. quack" has left a trail of anguish behind him. In my territory, one of these gentry made a call out in the country three miles, attempted to deliver a calf from a cow and killed both in the operation. He then operated upon the owner's war fund for thirty-five dollars. He ran bills wherever he could, and finally ran off with another man's wife, thereby suffering for some of the devilment he had been into.

The west is a land of big things. Ranches of many thousands of acres are common. Horses, cattle and sheep in bands or

herds of from one to ten thousand are not rare. When an animal gets sick it either dies or gets well without veterinary aid. The big ranchman is not a help to the veterinarian, and the only time the latter is called is when some contagious outbreak occurs. For this reason there may be only one veterinarian in a territory as large as the state of Delaware and still not be making over two thousand dollars per year.

Heretofore the low price of stock has been another factor against the veterinarian. In localities where pure bred stock are found many veterinarians are located. More graduates are coming out every year, while the non-graduates are becoming scarcer. In fact, the past five years in the west has not been very prosperous for the average veterinarian, and the graduate has profited more by the decrease in quacks or non-graduates than he has by increased stock.

State veterinary laws have not been held in very high repute. It is very seldom a conviction occurs, for if the defendant, no matter how guilty he is, can summon the required political pull, he usually gets off with such a little fine that he smiles. This condition is getting better each year, and conditions will be more ideal along this line a hundred years from now than they are at present. In all lines politics plays a large part and professional ability is very little appreciated.

The average income of the graduate veterinarian in the west runs from two to five thousand a year. Due to the enforced absence of booze in all forms, many of our brethren are saving a little money that formerly went to the distilleries or breweries. For the man who cannot do without booze, he will soon forget it should he move to Idaho, Washington or Oregon, where even the odor on one's breath is prima facie evidence of guilt.

A great many of the western ranchers are just getting a start in the world and are poor. Then again, others not so poor are even more tight. Collections are slow, many ranchers only paying once a year, while others cash up only every centennial. The cash customers are a delight to one's eyes but they are painfully few.

Living is very high in the west. Medicines are expensive, and automobile accessories out of sight. Gasoline was 27 cents last year, with prospects of Rockefeller donating more money to the Baptist Church, hence more raises. Tires are rather high also;

for example, the writer paid $48.00 per tire and casings for cord tires for a roadster. Medical supplies are in like proportion. House rent is exorbitant in many places; food is expensive and everything one has to buy is from two to ten times as much as back east. Many men with one or two children, living in their own homes, find that one hundred dollars per month does not go very far. The veterinarian has a good opportunity of buying advantageously, but even this does not reduce expenses much.

The climate is very good. Out here we do not know what it is to have to sleep out in the back yard in the summer with nothing on but a smile. As soon as the sun goes down a sweater or coat is welcome. The winters are often long, but the cold does not get so intense or full of pneumonia as back east. Then the cold is a different one than back east; ten below in a high altitude does not penetrate one near so much as ten above back in the middle west. But climate is a very ticklish question to tackle out west. Twenty miles make a difference of often a month in early spring. The sheltered river valleys may have grass growing in February; ewes are lambing; gardens are being planted, while ten or twenty miles away, upon the foothills of the mountains, lie three feet of snow.

What are the opportunities for veterinarians out west? Answering this, one can say about the same as back east. One will find the same drawbacks and same advantages. One will breathe more freely out here; he will soon absorb a western atmosphere that makes him forget the east. He will often improve in health; he may even make a little money. But the average veterinarian, with very little capital, should think hard and long before coming out here. If his resources are at all limited and he is making a fair living where he is, he had better think twice. If he has a large family it will pay him to think several times more. Out here it is a survival of the fittest. Whether one wears broadcloth or overalls, he is thought just as much of if he pays his bills. Family names have no significance; just because you belong to the leading clan in your home town in Punk City, Vermont, don't fondly imagine the denizens of Bunchgrass, Idaho, will respect you any more for it.

The west is full of college graduates. Don't think for a minute the whiskered rancher you meet is uneducated; he may be from a better college than you are. The miner, the stockman, the homesteaders and all of us in our varied pursuits of life, may be just as chock full of erudition as you are.

No better advice could I give to prospective westerners than to come out and view the country before shipping your furniture out here. Don't loaf around a chamber of commerce and talk with no one but the enthusiastic secretary whose job depends on how many suckers he hands out western blue sky visions to. Don't inhale all the beautiful dreams the real estate man hands you on the boundless opportunities open to all. Let him draw a long breath and he will confide to you that he has the best little ranch in seven states to give away to some honest, good looking man like you, and that in five years the people will be running you for governor or dog catcher. Talk with some old grizzled pioneer, or with some wideawake veterinarian who has been here some time, and you will soon learn that twenty dollar gold pieces don't grow on sage bushes.

PARASITES OF THE DOG IN MICHIGAN*

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While the parasites of the dog are of general interest, they are of particular interest to the veterinarian. The dog is one of the animals which come to our attention as patients, and parasitic infestations constitute a number of the complaints we are called on to treat. In our scientific work they serve as admirable experiment animals, and their response to treatment is so similar to the human response that our findings in regard to dogs are very readily applied to similar conditions in man; the dog has a digestive tract, food habits, responses to drugs and emotional responses very similar in most respects to those in man. Finally, dogs have certain good and certain bad qualities which concern us as individuals. Their good qualities make them valuable as companions, hunters, sheep dogs, watch dogs, etc. Their bad qualities make them objects of suspicion or condemnation as sheep killers, as destroyers of flower beds, as defilers of streets, sidewalks, and even food stuffs, and as carriers of parasites and disease.

That the dog is of real importance as a carrier of parasites and disease is something that is only beginning to be realized. Of

*Read before the Michigan State Veterinary Medical Association, February 7, 1917.

late we have been centering our attention on the louse, the fly and the mosquito as carriers of disease, but we must realize, and doubtless will in time, that the fly's capacity for carrying trouble into the homes of careful and intelligent people is probably less than the capacity of the dog who leaves that home by day or night to wander in Heaven knows what filthy and germ-laden surroundings, to consort with other dogs, themselves diseased and from homes where there are diseased persons and diseased animals, and finally to come home to cuddle up on the foot of the children's bed, to take a nap on the couch pillows, where presently the head of the dog's master or mistress or child playmate will rest, or to thrust his nose into a welcoming hand or a friendly face to receive or bestow caresses. We have learned to welcome the fly with a swatter; perhaps we will learn to welcome our pet dog, after he has been out for a day's hike or a night's debauch, by prompt immersion in a bath of adequate germicidal and insecticidal character. The rat and the rat-flea, the combination that keeps the human race in danger and dread of bubonic plague, are being met with rat-proof buildings, rat-killing campaigns, and rat guards and fumigation for ships, and legislators are making liberal appropriations to carry out these measures. Fortunately, this campaign meets with no opposition from any body of persons claiming to be lovers of rats. Unfortunately, the campaign to put the vagrant, worthless cur and the carrier of rabies in the same category as the typhoid fly and the plague-bearing rats, meets with a considerable opposition from persons who love good dogs, poets who write verses to the constancy of the yellow cur, and zoophiles who would sacrifice the welfare of the human race to conserve the supposed welfare of the lower animals.

How general is the growing interest in the dog as a carrier of disease may be judged from a few facts:

The British Medical Journal of July 15, 1916, had an editorial entitled "In Dirty Dogdom," which says in part: "The French Council of Hygiene devoted the greater part of its last session to the consideration of the public dangers associated with the inordinate keeping of dogs and the insufficient control exercised over them. In the first place, the Council, having discussed at length the * * * recrudescence of rabies * * * determined to require that the measures for holding the disease in check should be most strictly applied. Next, Professor Raphael Blanchard undertook to prepare a report on the dangers of dis-

semination of hydatid disease by dogs and the preventive means which should be taken. Finally, the Council adopted a resolution urging that the regulations with regard to the municipal taxes on dogs should be vigorously applied.

At about the same time, the Medical Council of the British Science Guild was adopting a resolution condemning the pollution of the streets of London and of most cities and big towns by dogs, and suggesting to the government and municipalities that the evil might be reduced by increasing the tax on dogs and enforcing by-laws * * * In towns the tax on dogs should be doubled, and a large progressive increase imposed on each additional dog. The proposal will probably have the cordial support of the majority of retail traders, who daily suffer loss owing to the primitive habits of the little darlings that the women drag about with them."

In this country the U. S. Department of Agriculture has issued a bulletin (Hall, 1915) dealing with the dog as a carrier of parasites and disease, and the sentiment of that bulletin, to the effect that dogs should be given reasonable care and supervision by their owners, or destroyed if they have no owners, has been editorially approved by the Journal of the American Medical Association and a number of other medical and non-medical publications. Similar papers, asking for a reasonable control of dogs have appeared in various places, and among the latest papers of the sort is one in Public Health, published by the Michigan State Board of Health, for January, 1917, under the heading "When the dog becomes a nuisance." In the paper just mentioned, the author (Bush, 1917) says "Practically every dog is loaded with intestinal worms." Which brings us, finally, to our immediate topic, the parasites of the dog in Michigan.

What parasites of the dog are found in Michigan and to what extent are they present? These questions I expect to answer, so far as possible, principally from post mortem examinations of 74 dogs from the Detroit city pound, covering the period from October 1, 1916, to February 3, 1917. I have made only a hasty examination of the literature along this line and find very little published covering the subject for the State of Michigan. While the parasites of dogs in Detroit for the season mentioned will give a fair idea of conditions in general, it must be borne in mind that there will be certain differences between city dogs and country

dogs, and differences may be expected in degree or kind of infestations for summer and winter, north and south Michigan, and nearness to or remoteness from bodies of water.

Before taking up a consideration of the internal parasites of the dog, just a word in regard to the external parasites. There has been very little time for investigation of this sort, but, on casual observations of a few dogs, we have found one heavily infested with lice, both the biting louse, *Trichodectes latus,* and the sucking louse, *Linognathus piliferus* (*Haematopinus piliferus*), being present, the biting lice being much the more numerous. Osborn (1896) says of the sucking louse: "We have examined many dogs in quest of it, but only a single specimen so far has been our reward". Herms (1915), on the other hand, says: "Although other observers have found the sucking dog louse, *H. piliferus* Burm., less common than the biting dog louse, the writer has found this species quite as common in California, if not relatively more abundant". Prof. Pettit, Entomologist at the Michigan Agricultural College, tells me that he has not found lice at all common on dogs in Michigan, the biting louse being seen more often than the sucking louse. We found one dog plentifully infested with the common dog flea, *Ctenocephalus canis,* and doubtless this flea is plentiful on dogs in Michigan as it is in most places. We did not find any ticks on dogs, nor any records of the sort, though Hooker, Bishopp, and Wood (1912) published a map of the United States on which Michigan is shown as within probable range of the common American dog tick, *Dermacentor variabilis.* Prof. Pettit states that hunters in Michigan have told him that they had found ticks on their dogs in this state, but no specimens have come in and the species is, therefore, uncertain. The demodectic mange mite, *Demodex folliculorum* var. *canis,* occurs in Michigan, as numerous cases of demodectic mange, reported to me verbally by Dr. Ferry and Mr. Rowe at Detroit, and by Dr. Ward Giltner and Prof. Pettit at Lansing, testify. Sarcoptic mange, due to *Sarcoptes scabiei* var. *canis,* probably occurs in Michigan as elsewhere, but I have not yet seen any cases or found any reports of this.

Regarding the internal parasites of the dogs examined, a few figures may be given. Of 102 dogs that came into our hands, 28 were rejected for experiment purposes on the strength of a negative fecal examination indicating that these dogs were not infested. This does not necessarily prove that these dogs had no intestinal

parasites. Worm eggs are not always present in the feces even when worms are present in the intestines, for the worms may be too immature to pass eggs, or they may be all males, (a condition I have seen a number of times) or the females may be so few (and we have several times seen a single female of a given species present) that the eggs are very scarce and are not found, or egg production may be inhibited by a number of possible conditions. Dogs with negative fecal examinations were occasionally accepted for experiments where infestation was unnecessary, and were later found to have light infestations. Of the 74 dogs examined postmortem, 67, or 91 per cent were found to have internal parasites. In other words, 67 dogs out of 102 or about 66 per cent, were certainly infested, and since some of the rejected 28 dogs would be found to have some internal parasites if examined postmortem, we can feel sure that, on an average, more than two out of three Michigan dogs are infested with internal parasites, so far as dogs from the Detroit city pound are indicative of conditions. On this point it might be said that the pound dogs are fairly representative. These dogs represent almost all breeds except the toy varieties, though of course nearly all of them are mongrel or at least not pure bred. Our records show the following: Mongrels, terriers, rat-terriers, collies, English bull dogs, hounds, poodles, bull-terriers, mastiffs, spaniels, cocker spaniels, dachshunds and mongrels of all these breeds.

Of the 67 infested dogs, 2 dogs, or 3 per cent, were infested with coccidia. So far, the forms I have examined, apparently the oocysts, have not been sufficiently developed to warrant even a tentative determination, but the large size, 36 to 40 μ long by 28 to 32 μ wide, precludes the idea that this is the form described from the dog in Europe by Stiles under the name of *Coccidium bigeminum* (*Diplospora bigeminum*), since the latter species and its varieties seem to attain a size less than half of this, so far as literature is available to me. Regarding the pathogenicity of these coccidia I can say little. One dog died 5 days after coming into our possession. This dog's liver was light colored, apparently due to some degeneration, but showed nothing suggestive of the condition present in hepatic coccidiosis of rabbits. The immediate cause of death was an intussusception of the ileum into the colon by way of the ileo-cecal valve, with a resultant hemorrhage that filled the cecum and colon with blood. Various coccidial stages were found in

scrapings of the mucosa of the small intestine. The other dog showed a temperature of 101° to 101.5° and was bright and active for six days; the next day the temperature was 102.5°, the next, 98.8°, the next, 95°, falling to 94.5°; the next day the dog was found dead. The liver showed no evidence of coccidiosis, and the coccidian is evidently an intestinal form, so far as our evidence goes. This dog had been under experimental treatment to test the efficacy of treatments designated to kill the coccidia. The number of coccidia present in the feces did not appreciably diminish during the short period of treatment, but it appears from the gastro-enteritis found on postmortem that the treatment or the combined effect of the treatment and the coccidiosis killed the dog.

Of the tapeworms found in the dog at Detroit, the most common are species of *Dipylidium*. Of the 67 infested dogs, 31, or 46 per cent were infested with *Dipylidium*, the worms being present in numbers from 1 to 205. One of these species is the form commonly reported, *Dipylidium caninum*. The other is *Dipylidium sexcoronatum*. This latter species has never been reported from the United States before. In Detroit, it seems to be more common than *D. caninum*. I have also found it in the dog at Bethesda, Md., near Washington, D. C. I venture to surmise that a careful examination of specimens of the double-pored tapeworm from dogs, commonly reported as *D. caninum*, will show a large proportion to be *D. sexcoronatum*.

It might be noted that *Dipylidium caninum* has been reported as a parasite of man about 80 times, 3 of the records being American. In one of these cases, reported by Stiles (1903), the worm was passed by a 16 months old child in Detroit.

Joyeux (1916) has recently demonstrated that fleas, *Ctenocephalus canis and Pulex irritans*, become infested with the intermediate stage of *Dipylidium* while in the larval stage, the adult flea being unable to ingest the egg of *Dipylidium*.

Of the 67 infested dogs, 4 dogs, or 6 per cent, were infested with tapeworms of the genus *Taenia*. In two cases there was 1 specimen of *Taenia hydatigena* (*T. marginata*) present, indicating that the dogs had fed on offal of sheep, cattle or swine infested with *Cysticercus tenuicollis*, the thin-necked bladder-worm commonly found in the omentum and mesenteries of these animals. In the other two cases there were, respectively, 1 specimen and 3 specimens of *Taenia pisiformis* (*T. serrata*), indicating that the

dogs had fed on offal of rabbits infested with *Cysticercus pisiformis*, the bladder-worm commonly found in the body cavity of rabbits. Prof. Pettit has specimens of this parasite collected from the cottontail rabbit, probably *Sylvilagus floridanus mearnsii*, around Lansing, and I have seen the same parasite in the cottontail, probably the same species, purchased in the market at Windsor, Canada, opposite Detroit. This bladder-worm and its tapeworm are probably common in Michigan as they are in most places. I noted (Hall, 1910) in a paper on the genus *Multiceps* (the tapeworms having a coenurus, a thin walled bladder-worm with numerous heads instead of one, for an intermediate stage) that there was in the collection of the Bureau of Animal Industry, at Washington, D. C., a specimen of *Multiceps serialis* collected from the rabbit in Michigan in 1904. This is the species which occurs as a coenurus in the connective tissue of the rabbit and other rodents, sometimes forming large swellings under the skin. The corresponding tapeworm occurs in the dog, and it is probable that this species occurs in the dog in Michigan.

Regarding the presence of other dog tapeworms in the state of Michigan, I have no positive information, but there are some surmises that may be made.

The gid tapeworm, *Multiceps multiceps* (*Taenia coenurus*) has never been recorded from Michigan. The larval stage, or coenurus, of this worm was reported from Michigan in the American Shepherd's Bulletin in 1903, the veterinary editor diagnosing a case in two important rams on the very characteristic symptoms given by a correspondent. Everything indicates that the disease was imported and that Michigan has been and is free from gid.

Dr. Shafter of the U. S. Bureau of Animal Industry at Detroit tells me that hydatids, the thick-walled echinococcus cysts, are occasionally found in meat inspection of swine which may be of Michigan origin. Should these hydatids be found to occur in Michigan hogs, it would indicate that the corresponding tapeworms giving rise to this very important larval tapeworm is present in Michigan.

The broad tapeworm, *Diphyllobothrium latum* (*Dibothriocephalus latus*),which is a parasite of dogs as well as of man, has been reported from man in Michigan by Haglestam (1896). His case occurred in a native of Finland and was probably imported. However, this parasite has been found in persons who have never

been outside of the United States, and Nickerson has found the larvae of this worm in fish caught in the Great Lakes. It is, therefore, quite possible that this tapeworm may be found, sooner or later, in Michigan dogs.

As regards the flukes in Michigan dogs, I do not find any records. However, the lung fluke, *Paragonimus kellicotti*, which occurs in dogs, cats and hogs in the United States, has been reported, under the name of *Distoma westermanni* (*Paragonimus westermanni*), from the cat in Michigan by Ward (1894). It is quite likely that this fluke occurs at times in Michigan dogs.

Among the nematode parasites of the dog in Michigan, the commonest is the ascarid. Of our 67 infested dogs, 47, or 70 per cent were infested with from 1 to 100 ascarids. In other words, of 102 dogs, 47, or 46 per cent, were infested with ascarids on the basis of postmortem examination of fecal examination. Allowing for the limitations of fecal examination, it may be confidently asserted that half of the dogs in Michigan are infested with ascarids, if the Detroit figures are indicative of conditions, as they probably are. This is a higher figure than I find reported for Denmark, Iceland, Australia, Germany, or elsewhere in this country.

All of the worms that I have examined have been *Belascaris marginata* which is also the common form at Washington, D. C. The other species, *Toxascaris limbata*, is apparently the less common form in this country. These worms are normally parasitic in the small intestines, but are occasionally found in the stomach, a condition which commonly leads to their being vomited. They are an important pest of dogs, and are often held responsible for fits in pups. It is quite likely that they are often responsible, as these large active worms in the intestines give rise to considerable irritation and at times quite surprising reflexes. Ascarid worms are notorious for their wandering habits, often entering the bile duct, pancreatic duct, cecum, and stomach, and occasionally coming up the esophagus, and down the trachea, or into the eustachian tube. These conditions, commonly reported for man and for hogs, are apparently rare in dogs, and I have never seen the ascarid outside of the stomach or small intestines, except when passing out via the large intestine. One of these ascarids, *Toxascaris limbata*, has been reported a number of times from man, due to too friendly intimacy between man and dog and disregard of hygienic precautions.

Galli-Valerio (1915) says that he has confirmed the work of Dorbernecker in finding evidence of blood in ascarids, the blood being demonstrated by spectroscopic methods. He regards this as evidence that ascarids are blood suckers. This is not wholly conclusive. According to Garin, ascarids feed on epithelial cells, and the evidence of common observation and of the morphology of the ascarid's mouth should absolve it from the claim that it is a blood sucker in the ordinary sense of the word. Recently an ascarid which I collected from the feces of a dog showed a pronounced red color in the intestine, evidently due to blood. But a postmortem examination of the dog the same day showed the presence of a severe hemorrhagic enteritis. This was evidently the explanation for the blood in the ascarid in this case. Something of the same sort may have been the explanation in the cases of Dorbernecker and Galli-Valerio. In other words, ascarids will doubtless ingest blood as well as epithelial cells or other things, without being true blood suckers. The ascarids may occasionally lacerate the intestinal mucosa, and we know that ascarids occasionally perforate the intestinal wall, and in so doing it is likely that they ingest some blood. But this must be regarded as exceptional; and before regarding the ascarid as a blood sucker, it should be demonstrated that ascarids in general show the presence of host blood.

In another paper (Hall, 1917) I have recorded some experiments on the longevity of ascarids outside of the body of the host. Wharton (1915) kept the ascarids of man, *Ascaris lumbricoides,* alive in Kronecker's solution (normal salt solution to which 0.06 gram of sodium hydroxide per liter is added) for 6 to 12 days. At Detroit we have kept dog ascarids, *Belascaris marginata,* alive in this solution for 14 days. The ascarid of the pig, *Ascaris suum,* I have kept alive in Kronecker's solution for 26 days, and in normal salt solution for 15 days. In the paper mentioned, I have pointed out the bearing of these facts on the action of anthelmintics. It is believed by many veterinarians, physicians and laymen that when a worm-infested patient is fasted for 12 to 24 hours, the worms become hungry and will eagerly ingest an anthelmintic, especially if administered in what is regarded as a palatable vehicle. It will be evident that a worm that can live 2 or 3 weeks or longer on such an innutritious diet as Kronecker's solution, will suffer little for 12 hours spent in feeding on its customary diet, the epithelial cells, in the warm intestinal tract of its host.

Of course, the fasting preliminary to anthelmintic treatment is valuable since it removes much of the bulky food mass that might protect the worm.

Next in number of infestations to the ascarids are the whipworms, in numbers from 1 to 33. They are the whiplike worms which occur in the cecum usually, with the slender anterior end sewed into the mucosa. It has been supposed that the penetration of this unarmed head into the mucosa is effected by the solvent action of some secretion. Its pathological importance in dogs does not appear to be very great as a rule.

The next most common parasite in our series of dogs was the hook-worm, *Ancylostoma caninum.* This was present in 23 of our 67 infested dogs, or in 34 per cent. There were from 1 to 70 present. I have never yet seen a specimen of the other dog hookworm, *Uncinaria stenocephala,* nor were there any specimens in the extensive collection of the U. S. Bureau of Animal Industry at Washington, but Muldoon (1916) reports both hookworms as present at the clinic of the College of Veterinary Medicine at Ithaca, N. Y.

So far I have seen no hookworm infestations in Michigan dogs which were as heavy as those in Washington, D. C. The heaviest infestation seen in Detroit totalled 70 hookworms, and this infestation in a puppy had given rise to a clinical case of hookworm disease. In Washington, Mr. W. D. Foster and I found infestations with 104, 233, 242, and 812 hookworms. This is what might be expected. The development of hookworm eggs outside of the host animal to the infective stage depends largely on the factors of warmth and moisture. There is an abundance of moisture in Michigan, as there is in the District of Columbia, but the lower temperatures in Michigan are less favorable to hookworm development than are the higher temperatures of the District. In the southern United States conditions are even more favorable to hookworm infestation, and in some localities breeders find it difficult to raise pups on account of the mortality from this disease.

Of the nematode parasites of the dog, one which does not occur in the digestive tract has lately received some little attention in print. This is *Dioctophyme renale* (*Eustrongylus gigas*), the giant kidney worm of the dog. This worm is the largest of all the true nematodes, the female attaining a length of about one meter and a thickness of over a centimeter. The worm is blood red and

very striking in appearance. It is usually reported from the kidney or from the body cavity, rarely from other locations. Riley (1916) recently summarized the cases from the United States and Canada, a total of 27 cases, the worms being in the body cavity in 12 cases or 44 per cent. From Riley's paper it appears that cases have been reported from Charleston, S. C., Georgetown, S. C., Washington, D. C., Baltimore, Md., Pittsburgh, Pa., Philadelphia (?) Pa., Ithaca, N. Y., Albany, N. Y., New York City, N. Y., Kingston, Ont., Toronto, Ont., Columbus, O., and Winnipeg, Manitoba. A case which Leidy reports, on the authority of Mr. Joseph Jones, of Georgia, of the occurrence of the worm in the heart of a dog, has been generally discredited by parasitologists, though Riley is inclined to accept it. Personally, I feel that there was more likelihood of mistaking a blood clot for this worm, and a mistake of this sort is known to have been made, than that such an unusual thing should be true. In this connection I wish to mention a trifling error, which by some inadvertence, has crept into the paper by Riley and Chandler (1916), reporting one case of this parasite. In their plate I, the figure of the worm is stated to be reduced one-fourth. As the figure is 37.5 cm. (almost 15 inches) long and .9 cm. (about 3/8 inch) thick, this would make the worm 1.5 meters (5 feet) long and 3.6 cm. (1½ inches) thick.

As I noted that Riley's records did not include two published cases of which I had records, I published a note (Hall, 1916) reporting these cases and adding a new case. One of the published cases was from Baltimore, Md., and the other, as a later note by Kaupp (1916) makes clear, from Chicago, Ill. The new case was from Ann Arbor, Mich., and is the first record of this parasite from Michigan. To that record I wish to add at this time. Two of our 67 infested dogs from the Detroit pound, or 3 per cent, were infested with *Dioctophyme renale*. In one case the worm was a female, 36 3/8 inches (91.7 cm.) long by 5/16 inch (8 mm.) thick. The head was near the gall bladder, the worm extending forward between the lobes of the liver on the right side, then forming a large coil between the liver and diaphragm, then between the liver and diaphragm to the left side and along the body wall, then in to the intestines, the tail lying under the omentum. In the other case there were two male worms present in the abdominal cavity, one lying between the body wall and the liver and intestines on the right side, the other involved in the gastro-hepatic omentum. In

both dogs the great omentum was inflamed. This is a common lesion in infestation with this worm, and presumably results from the protective activity of the omentum in guarding the host animal from the excretions and secretions of the parasite. Dr. Brenton tells me that he has seen about a half dozen cases of the occurrence of this worm in dogs in Detroit, the worm being in the body cavity in all cases. My own records added to Riley's show a total of 32 cases from the United States and Canada, 3 of these cases being from Michigan. Of the 32 cases the worm was found in the abdominal cavity in at least 16 cases, or 50 per cent. With Dr. Brenton's cases we have about 38 cases from the United States and Canada, with over half of the records reporting this giant kidney worm from the abdominal cavity.

(Since the above was written, a later paper by Riley (1917) has come to hand. In this paper Riley records one additional case from Chicago, and notes an indefinite number of cases at the same place. It appears, therefore, that the worm has been found at least 40 or 50 times in the United States. Riley discusses the theory, first suggested by Stratton in 1843, that infestation of the peritoneal cavity might occur by way of the Fallopian tubes in bitches. In the American records, 7 of 8 peritoneal infestations, where the sex is given, were in females. In both of my cases the animals were females, making a total of 9 cases out of 10, or 90 per cent of cases in females for American cases where the sex is known.)

It is rather surprising to note that in our series of necropsies cases of infestation with *D. renale* were as numerous as cases of infestation with coccidia or even with the very common *Taenia hydatigena* or *T. pisiformis.* It is surmised that *D. renale* has an intermediate stage in fish, since it occurs in the seal, otter, mink, etc. If this is true, it may account in some degree for the surprising frequence of these worms in Detroit.

A comparison of the figures for the 67 infested dogs examined by Mr. Drake and myself in Detroit with those for 76 infested dogs examined by Mr. Foster and myself at Washington, indicates that in general worm infestations are slightly more numerous and heavier in Washington. Thus 51 per cent of Washington dogs have *Dipylidium* in number from 1 to 1500; 8 per cent have *Taenia* in number from 1 to 2; 57 per cent have whipworms in number from 1 to 331; 71 per cent have hookworms in number from 1 to 812. On the other hand, 70 per cent of Detroit dogs have ascarids,

while a slightly smaller proportion, 67 per cent, of Washington dogs are so infested, and 3 per cent of our series at Detroit had *Dioctophyme,* while we found it in none of the larger series at Washington. At an earlier period in Washington, Sommer (1896) found *Taenia* in 14 per cent; *Dipylidium* in 44 per cent; ascarids in 28 per cent; hookworms in 56 per cent; whipworms in 70 per cent; and *Dioctophyme* in 2 per cent. It would appear from this that Washington dogs have more hookworms and whipworms, while Michigan dogs have more ascarids. The above figures cannot be compared exactly for the reason that we had rejected some dogs on negative fecal examinations.

Dogs in Lincoln, Nebraska, according to Ward (1897), have few hookworms and ascarids, and many tapeworms. In Colorado Springs, Colo., I found hookworm infestations quite uncommon, doubtless due to the combination of bright sunshine and dry air and the low temperature at night.

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THE NECESSITY FOR ADEQUATE MEAT INSPECTION LAWS FOR THE RURAL DISTRICTS*

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Vitally essential to the Public Health interest of our state, is the enactment of an adequate Meat Inspection Law. It is imperative that such an act be placed upon the statute books of New York State. The economic interests of the state require this. It has been shown by experience in other lines, that a larger and more profitable business can be done when such business is properly conducted and systematically regulated. The livestock interests of our state have suffered because of the lack of proper jurisdiction, and the Public Health interests of our rural districts have suffered from this same lack of supervision and care; those who live in the rural districts do not share, to so great an extent, the benefits which come from federal and municipal inspection, as do those who reside in or near the cities, protected by such laws.

There is no measure which could be enacted, which would aid to such a great extent in detecting and controlling infectious dis-

*Presented at the April meeting of the New York City Veterinary Medical Association.

eases of animals as a good meat inspection law. By its aid epizootics could be averted, for it would give a positive clue to the point of origin of a disease and its spread could be immediately checked without the enormous expenditures which are often necessary to stamp out an infectious disease after it has become widespread. From an ethical standpoint alone, it behooves us to enact such a law, because it would enforce cleanliness and sanitary habits upon a class of people who handle and prepare the food we eat, and who are ofttimes remiss in such matters where it involves an expenditure. Too much stress cannot be laid upon this particular point, for the violations are extreme in many instances. Conditions under which animals are sometimes slaughtered and dressed are so revolting that a person of refinement would sicken at the thought of having to eat food prepared in such an unwholesome manner. To emphasize the need of local inspection, let me quote from Dr. A. D. Melvin's Report of the Bureau of Animal Industry,—"Uninspected slaughterhouses as a rule, have many features that are not only objectionable, but dangerous to health. The smell of the country slaughterhouse is proverbial, and the conditions at some of the places are inexpressibly foul and filthy. They are usually located in some out-of-the-way place, and sometimes outside the corporate limits, often surrounded by stables, or even being a part of a building which is also used as a stable, barn, or for some such purpose. Sometimes they are located on the banks of small streams and pollute the water. Such places are often the means of spreading disease. It is frequently the custom to feed offal to hogs or to throw it where dogs, hogs, and rats *have access to it*. By this means trichinae, tapeworms, and other animal parasites are disseminated, some of which are dangerous to man. Hog cholera, tuberculosis, and other contagious diseases may also be spread by such conditions. Usually there is no protection to the meat against rats, flies, and other insects and vermin, and this condition constitutes a dangerous source of contamination and infection."

For our legislators to ignore the need of remedial measures *is criminal*. The best laws are none too good where health is at stake, and just here I want to quote the motto upon the letterhead of the New York State Department of Health, viz: "Public health is purchasable. Within natural limitations any community can determine its own death rate!" I earnestly implore this associa-

tion as a body of trained specialists in animal diseases, sanitation and hygiene, to use its great influence in having enacted proper laws to safeguard the health of those people of the state who at present derive no benefit from the federal or municipal inspections. According to statistics these people comprise about 21% of the entire population of the state. They surely are entitled to some consideration. Let us urge our law makers to "purchase a little public health", it will prove a paying investment.

The United States Government in 1916 spent over $3,000,000, and will spend in 1917, $3,600,000 for meat inspection.

As a result of our thorough *federal* meat-inspection methods our export trade has improved, and foreign countries, which at one time rejected our meats and meat products, now unhesitatingly accept them with full confidence in their purity and freedom from contamination.

The present federal law requires an ante-mortem as well as a post-mortem examination of animals, and it has been stated that it is the custom of many of the owners of slaughterhouses under federal inspection, where large numbers of animals are handled, to engage men, skilled in meat-inspection, to examine all animals and segregate those which they doubt will pass the federal inspectors, and reship them to other points where no inspection is required.

Let us "put up the bars", and protect ourselves from any such possible imposition, by enacting suitable laws; laws which shall cover the conditions and surrounding of all animals slaughtered for food, at the time of slaughter, and through all the processes of preparing the same for food uses, viz:—smoking, canning, curing, and preserving in any way.

Let us inaugurate a systematic campaign of education in the matter of making the meat-food supply for home consumption from every part of our state, from the remotest farms, as well as the largest city, just as surely a healthy, sanitary product, as that which we must produce for export from the state, under the present federal laws. Let us show the people, first, just what they get in "uninspected" meat, and meat products; through ignorance sometimes, but generally through criminal negligence and inattention to the first, most simple and necessary, sanitary requirements. Let us place the matter as to conditions, simply and intelligently before the consumers. Let us make them force the producers to give them the best, and only the best. They must first

see and acknowledge this evil, before it can be fought and overcome, and it is only by well organized, concerted action that we can accomplish any good results.

In our large cities we have some protection, under the laws of the boards of health, but these laws are *not* far-reaching enough, and even in the outskirts of our largest cities, and uniformly in the smaller towns and all rural districts, slaughter of diseased and "suspicious" animals is permitted, uninspected, unmolested, unrebuked. This meat is placed on sale, and finds its way to your table and mine, perhaps. Could we but show the consumers the filthy, revolting, unsanitary conditions under which even healthy meat is slaughtered and prepared for their use they would not need to know that animals too badly diseased to pass the federal inspector, or boards of health inspectors in our cities, are passed on to local abattoirs and butcher-shops, where danger of inspection is nil, and this same meat is permitted by our lax laws to be placed on sale, to jeopardize the health of the ignorant and innocent. There is just as great a need to enforce sanitary conditions to govern the slaughter of food-producing animals, as there is to insure the killing of only such animals as are fit for food purposes. It is true that the average consumer can detect tainted or spoiled meat, but he could not be expected to determine that an animal had been affected with a contagious disease. This must be done, at the time of killing, by a competent and skilled veterinary inspector. We must have a law which will protect the consumer against his own ignorance.

Let me distinctly set forth:

1. That the federal government has no jurisdiction, whatsoever, over animals slaughtered, to be sold and consumed within the state.

2. That, in our rural districts, conditions not covered by federal inspection laws, are met with.

There are problems to be solved which call for a special jurisdiction. It is true, the object is the same in each instance, but the methods employed must be different. These must meet conditions as they exist.

Let me call your attention to the alarming extent of disease among animals offered for slaughter as evidenced by federal inspection statistics. Nearly 2% of all inspected carcasses are affected, in part or in whole. It is a well known fact that tubercu-

losis is more prevalent among dairy cattle than among animals which range in the open country. Statistics show that the large slaughterhouses under federal inspection, draw their supply of cattle principally from the great ranges of the West, and that the greater percentage of animals killed in local slaughterhouses and butcher-shops are obtained from dairies. We have only to deduct from this, that the majority of carcasses offered for sale through these sources, are thus affected.

The following diseases and conditions (under the federal inspection laws) make the meat of food-animals unfit for human consumption:—anthrax or charbon; rabies; blackleg; hemorrhagic septicemia; pyemia; septicemia; vaccinia; tetanus; malignant epizootic catarrh; hog cholera; swine plague; actinomycosis; caseous lymph-adenitis; tuberculosis; Texas fever; parasitic ictero-hematuria; tapeworm cysts; infections which may cause meat poisoning; uremia and sexual odors; icterus; urticaria; melanosis; tumors; bruises; abscesses; liver flukes, etc; emaciation and anemia; milk fever and R. R. sickness; pregnancy and parturition; immaturity; diseased parts; suffocation; dead animals; bruised parts.

The same regulations and careful culling out of dangerous meat-food products should be made to apply to all animals slaughtered within the state for home consumption. The state should inspect present conditions in local slaughterhouses, butcher-shops, outlying farms, wherever animals are slaughtered to be used for food. It should inspect and condemn; then suggest, and provide for the remedy. It should institute a careful supervision of the work of making perfectly sanitary, the conditions under which our meat and meat-products are prepared for use. It is impossible, and impracticable at this time to suggest in detail what must be done.

First and most essential, are the sanitary conditions. This means cleanliness, light and ventilation, water, dressing-room and toilet facilities. Disposal plants, for taking care of diseased carcasses, or parts of carcasses, offal, blood, etc., so that these will not be at any time exposed to flies, insects, dogs, rats, or other dangerous carriers of infection and disease. We must not forget that meat is one of the greatest carriers of pathogenic organisms, and that it readily decomposes when not properly taken care of. It must go further, and see that in the canning, curing and preserving of meat products no harmful chemicals and preservatives are used,

and, when all is ready for market it must insist on no false or misleading labeling of such products.

The law must take into consideration the location, construction and maintenance of properly constructed, thoroughly sanitary and convenient slaughterhouses or abattoirs, for local use; also, a competent system of inspection. This has been thoroughly tried out and found most effective and satisfactory in Europe, but we are slow in following a worthy example, in this important instance.

This system of inspection in rural districts has the tendency to make the local producer take greater care of the health of his animals. He must do this in order to "Pass Inspection", and this will greatly elevate the standard of health of our farm animals. If, on the condemnation of an animal, the producer is made to share the loss,—or if the law insists that animals sold for slaughter, must be in proper condition at the time of such sale, then we will find the producer anxious to have healthy animals, and willing to work to this end. As it is now, in rural districts we find cattle, too old and worn out to be used for dairy purposes, killed and sold for food. Animals which have never been tested; whose meat is not inspected. It is in these same districts that we will find our greatest difficulty in working out a plan for inspection which must be thorough, but inexpensive.

A centrally located abattoir, owned by the township, could be small, but perfectly fitted out for the purpose; expenses could be met by a small *per capita* fee:—and a trained veterinary inspector could be in charge, at certain times, on certain days, as business would warrant. In some sections one inspector could have charge of a number of these places, having stated times at each place. Our state is graduating practical meat inspectors every year. We spend vast sums fitting men to fill such positions, and then do not make use of the knowledge which they have acquired. We veterinarians can appreciate the fact that it is most desirable that the work of inspection should be done by veterinarians, who are skilled in recognizing the presence of disease in the animal, and are also aware of the harmful effect on man of the consumption of such diseased meats. We are scientifically trained not only to detect the presence of disease, but to know whether it is communicable to man and if so, under what conditions.

Typhoid fever has been caused from the pollution and contamination of meats by impure water, as instanced in the slaughter of animals on the banks of a stream, or in the proximity of wells and cisterns, where such water is used in washing the carcasses.

There are within our state, slaughterhouses where horse-meat is prepared and sold for human consumption, under most unsanitary conditions. Some of these places have been found to be so unwholesome, so absolutely filthy, that local health departments have exerted their authority and caused them to be closed. There are some still in operation, and under existing circumstances this meat can be sold for food.

We need immediate protection from unscrupulous producers and their agents. Too long have we been sitting supinely, *we, who are cognizant of facts.* We are *"our brother's keepers"*. Let us be up and doing. Let us of the Empire state set an example to our sister states which will be followed by all to their great advantage. Let us be the pioneers of this movement for state inspection, which shall be a credit to us; which shall conserve the health of our live-stock, the health of our people, and their ever increasing prosperity. We *can* do this. Shall we?

NAVEL ILL*

S. L. Stewart, Kansas City, Mo.

After several years of study and a great deal of thought and investigation on the subject of navel ill, I have come to the conclusion that there is plenty that may be learned about this disease, especially along the lines of organisms which cause the disease; the mode of entrance into the body; how the organisms are distributed to the different parts of the body; the different types of the same disease; how best to treat the disease, preventive or medicinal.

The cause of navel ill: investigators believe that no one organism causes the disease, that as a rule several microorganisms have been isolated from the diseased joints and navel,—the *B. coli*, staphylococcus, streptococcus, *B. tetani.* Dr. Schofield, of the Ontario Veterinary College, claims to have isolated the *B. abortus*

*Presented at the Oklahoma State Veterinary Medical Association meeting, May 3rd and 4th, 1917.

equinus in cases of naved ill where symptoms showed up within a few hours after birth, in areas where abortion was prevalent, and Dr. Mack of the University of Nevada claims to have isolated the *B. necrophorus,* in cases of navel ill in lambs on premises where sheep had foot rot.

The mode of entrance of the organisms into the body is of importance. Some authorities maintain that the germs causing navel ill gain entrance to the body at the time of, or soon after birth, before the navel dries, which seems to be the opinion of most practitioners and those who have done research work along that line. Reports of cases of navel ill where the colts were foaled in pastures in which there were no sheds or feed racks are comparatively few, and when such cases are reported, usually upon a thorough investigation it is found that the colts were dropped on the ground where stock congregated on account of annoyance by flies, thus developing a place for contamination equal to that of a barn yard or possibly the barn.

A Percheron colt, eligible to registration (which was the property of Mr. Kessler, of Iowa), was foaled in a pasture where there was not even a feed trough, but within seven days after birth the colt showed symptoms of navel ill and died within a few days after the symptoms first appeared. Upon investigation it was found that at the time of birth the colt was dropped into a small drain, which carried water from the barn yard during rainy weather, and there is no reason why the drain was not as badly contaminated as the barn yard itself. The colt evidently received the infection at that time, as a post mortem examination showed that the infection gained entrance through the navel.

It has been said by some investigators that navel ill was contracted intra-utero, and in some rare cases this statement seems to have some virtue, as in some cases it is said that the symptoms of navel ill are shown within a few hours after birth. It is said that in some of these cases there is shown on post mortem examination internal lesions of some of the internal abdominal organs, and swelling of some of the joints at time of birth. However, we must not lose sight of the fact that many colts at foaling have large joints on account of the loosely arranged structures, especially the ligaments and joint capsules, the capsules being filled with seemingly an abnormal amount of synovia.

It has not been the experience of the writer to observe a case which was even thought to be infected intra-utero. Intra-utero infection, if such a condition does exist, could only take place by the germs gaining entrance to the uterus, through the os uteri, or pass through the maternal system after gaining the capillaries of the mucous membrane of the uterus, the organisms then producing a suppurative area which may slough through and into the chorion of the placenta, where possibly the germs might gain entrance to the capillaries of the fetal circulation, and from there pass into the body of the fetus, but even then it seems very probable that abortion would follow.

In the years of 1913-14-15 a careful canvass of 85 farms was made in 14 different states where navel ill was prevalent, or had been prevalent for some time, and it was found that the number of foals reported for the three years on the 85 farms was 1616, or an average of 19 foals per farm. The number lost from navel ill within the three years was 133 head, or about 8 per cent. of the crop of colts for that time. Of the 85 farms, the owners of 25 farms were induced to clean the barns or stalls and some used disinfectants, and special care of the navel at birth was given, and from the 25 farms the loss last year was a little less than one per cent.

Dr. Mack, of the University of Nevada, reports umbilical necrobacillosis in lambs, on one ranch where 4000 ewes were wintered and sheared. In the spring following 5200 lambs were born. Twenty-two hundred lambs died and of this number 70 per cent., or 1540, died of navel ill. The premises were scraped, filled and cleaned, and no loss from navel ill resulted the following year.

It is conceded by Hutyra & Marek, Nocard, and I believe by Dr. Williams, of Cornell, that white scours in calves is frequently caused by the organisms gaining entrance through the broken end of the umbilical cord at the time of birth, or soon thereafter. Sanitation and isolation have so far reduced the usual number of cases on infected farms.

It is now believed that navel ill in pigs is very common, especially years that climatical conditions favor development of such organisms, or years that climatical conditions are less favorable for the resisting power of the young pigs. However, navel ill in pigs should not be confused with so-called articular rheumatism, arthritis.

The mode of distribution of the organisms within the body of the young depends altogether on what part of the broken end of the navel cord the organisms enter the body and what structure or structures are involved. In some cases of navel ill due to infection after birth, the organisms enter the umbilical vein and finally gain the general circulation, to become widely disseminated; in other cases the infection gains entrance through the urachus and thence to the bladder, and in many cases from there through the ureters to the kidneys; in rare cases infection takes place through the umbilical arteries, thence to the external iliac arteries, and on into the general circulation; in those cases of intra-utero infection the organisms must pass from a sloughing area of the uterus and chorion into the circulation of the placenta, and then, through the umbilical vein, and finally the general circulation of the fetus, which must take place near the time of parturition, or abortion will occur before the normal time of parturition.

Navel ill may be classified as to the nature of the disease developed, as—1st, septic arthritis; 2d, tetanus; 3d, pervious urachus, frequently accompanied by septic arthritis; 4th, where the visceral organs are involved, especially visceral necrobacillosis in lambs; 5th, white scours in calves.

Treatment has given more or less uncertain results, probably because of the lack of care of the young following birth, until the stump of the navel cord dries. Bacterins are used as a preventive with fair results. Best results have been obtained where sanitary measures were observed in combination with the use of navel ill bacterins.

As a preventive, bacterin should be given at least in two doses, one dose at time of birth, another within a week or ten days later, and where infection that causes navel ill is known to exist, the stump of the cord should be cared for by stripping off the coagulated mucus, (Wharton's Jelly) with the thumb and fingers and applying tincture of iodine, or some agent which has a tendency to dry the surface of the stump, as well as possessing antiseptic properties. Bacterin treatment of the dam before parturition is still in the experimental stage, but has been tried out to the satisfaction of the few veterinarians who have used the method and with them, bacterin treatment of the dam, has proven very satisfactory. This mode of treatment should be carried on

by giving one dose of bacterin thirty days before the time of parturition, a second dose two weeks later, and a third dose two or three days before parturition, followed by a dose of bacterin given to the young within five to seven days after birth.

Proper sanitation, cleansing the stables and stalls by disinfecting the same, has proved to be the most efficient mode of preventive treatment, and where sanitary regulations have been followed in combination with bacterin used as a preventive, the best results have been obtained.

Bacterin, or other treatments, after symptoms of navel ill have appeared, is not as effective as some reports have led us to believe and the mortality is much greater than from preventive treatment and sanitation.

Dr. Schofield, formerly of the University, Veterinary Department, Toronto, Canada, reports that out of 170 cases of navel ill in foals, treated with bacterin, 75 per cent. of the cases were saved, leaving a loss of 25 per cent., while the loss of foals without bacterin treatment runs as high as 90 per cent.

BLACKLEG FILTRATE

Dr. A. Eichhorn
From the Lederle Antitoxin Laboratories, Pearl River, New York

For the prevention of disease there is no biological product used as extensively and which has become so well established as blackleg vaccine. The good results which followed its introduction are now being recognized throughout the United States and it may be safely stated that in blackleg districts a considerable proportion of animals are now being annually vaccinated with this product. The available statistical data proves the remarkable reduction of losses from the disease as the result of systematic vaccination.

The most common method of vaccination against blackleg which is being employed, not only in the United States, but also in other countries where blackleg is prevalent, consists of the injection of attenuated virus prepared in either pellet or powder form. The number of annual vaccinations with this product amount to many millions, and while the reports prove conclusively a marked reduction in the number of deaths following vaccina-

tion, nevertheless the results cannot be expected to be uniformly satisfactory, as direct losses from vaccination are known to occur from time to time; and, furthermore, insufficient protection following vaccination is also of common occurrence.

The vaccine prepared in pellet or powder form is the outcome of early investigations on blackleg immunization by Arloing, Corvin, and Thomas to whom the honor belongs of developing the method of immunization known as the "Lyon Method." The principle of this immunization consists in the attenuation of dried juices from blackleg lesions of an animal which has succumbed to the disease. The attenuated material is subjected to two different degrees of attenuation—one being exposed to a higher temperature and used for the first injection and the other attenuated at a lower temperature and used for the second injection. The injection is made into the dense tissue of the tail with the intention that the firmness of the tissue would prevent the rapid development of the reaction following the vaccination.

This method has been extensively employed throughout the world and the results might be considered highly satisfactory, although losses from vaccination and insufficient immunity have been observed from time to time. Furthermore, complications resulting from the injections, such as necrosis of the tail, etc., are not unusual.

Kitt in 1898, published the results of his experiments whereby he succeeded in simplifying the "Lyon Method"; his process requiring only a single injection, and he further recommended that it be made in the shoulder region where the skin is loose and easily pierced by the needle. For the preparation of the vaccine, Kitt utilized the affected muscle of the animal which was cut into strips, dried and pulverized in a drug-mill. The powder is then mixed with distilled water into a paste, filled into shallow pans and placed in the attenuating oven where it is subjected to a temperature of 95° for a period of six hours. The attenuated material is then ground into a powder which is prepared into either pellet or powder form (Government Vaccine).

In considering the method of preparation of the vaccine, it must be realized that the product is comparatively crude. Blackleg vaccine as marketed at the present time cannot be accurately standardized and a single dose may contain 100,000 or one million spores and at other times a much smaller number, if any. Such

a variation would naturally result in irregularities of the immunizing action of the vaccine, and it is no doubt due to this fact that direct losses from vaccination and from the natural infection after vaccination, cannot be entirely avoided.

The short-comings of the blackleg vaccine lie mainly in the fact that in its production the spore contents of the product cannot be accurately estimated. It is true that the vaccine is weighed or measured, but it is impossible to establish the amount of active virus which it contains. Not only is it impossible to determine the amount of living vegetative blackleg organisms and spores in the tissues used for the vaccine production, but it is also impossible to estimate how much of the active material will survive the attenuation. The variation of the amount of virus in the affected tissues of an animal is, no doubt, considerable and the effect of the attenuation upon the virus may also vary in the different lots used for the vaccine production. The former views—that the individual organisms of a culture or of an infected focus are biologically uniform—can be no longer substantiated; and likewise, there is no longer any doubt that the individual vegetative form or spores possess a varying susceptibility toward exposure to higher temperature. Accordingly, the reduction of the number of organisms following heating is not always uniform. Thus, it is impossible to determine whether the original material used for the vaccine production contained an insufficient number of organisms or spores, or to what extent they might have been injured or destroyed by the process of attenuation. There are no scientific methods known to overcome these deficiencies.

In order not to bring this method into disrepute, it would be essential to eliminate these short-comings. It is a recognized fact that in blackleg vaccination sufficient immunity is only obtained in case the spores contained in the vaccine have actually germinated in the animal. To develop a vaccine of a potency which would be capable of inducing only a very slight infection and at the same time to limit its action within safe borders, so that the infection does not become too severe or fatal, has not been attained by the present method.

A further technical deficiency in the preparation of the vaccine from blackleg meat and juices, consists in the irregular consistency of the vaccine powder and of the emulsion prepared therefrom. It is natural that the preparation of a homogeneous

solution from the powder is almost impossible and if the vaccine contains an insufficient number of broken up clumps, the results are naturally different than when a homogeneous emulsion is employed.

In view of the imperfection of the vaccine prepared from the affected parts of a blackleg carcass, investigators have directed their attention toward developing other methods of vaccination by which these deficiencies might be overcome.

Attention was then directed toward developing a vaccine consisting of the attenuated cultures of the blackleg organisms. Kitt, Detre, Poels and others, have employed blackleg cultures in which the organisms were attenuated in various ways for the immunization against blackleg. The results were not uniformly satisfactory. However, in various localities one or the other method has established itself and is now being used to some extent.

Later, Leclainche and Vallee developed a liquid blackleg vaccine which they tested out very extensively and it is now being employed in different countries with fairly good results. The short-comings of the liquid blackleg vaccine must be recognized since it is subject to the same deficiencies as is the Pasteur vaccine for anthrax, viz.—a careful standardization of the product is almost impossible; the keeping qualities of such a vaccine are limited; and furthermore, it is a recognized fact that the blackleg organism does not retain a uniform virulence upon artificial cultivation. These factors, no doubt, are responsible for the fact that the liquid blackleg vaccine is not attaining popularity for vaccination against blackleg.

With the advent of the development of the different immune sera for the prevention and treatment of diseases, the utilization of animals for the production of blackleg immune serum has also been undertaken. For this purpose, horses and cattle have been injected with cultures of blackleg, at first in small doses, which later are increased until as high as 500 c.c. are injected intravenously. Unfortunately, at the present time we have no means for an accurate standardization of such serum since it is a recognized fact that the laboratory animal tests are unsatisfactory for such purposes. The writer is now carrying out experiments by which the various products for blackleg may be more accurately standardized and the results along these lines are very promising.

In the case of the serum, the complement fixation or agglutination may yield the desired results whereas with the other products, especially with the germ-free extracts and filtrates, the toxicity will have to be given consideration in the standardization of the products.

It is natural that the use of the serum for the control of blackleg has its limitations. The injection of an animal with serum induces only a passive immunity which at best would protect the animal for a period of only one month. However, in herds where the disease has already caused considerable losses, the animals might be subjected to the serum treatment, to be followed later by an active immunization.

For curative purposes, blackleg serum is known to exert a very favorable action, but in this instance also it must be recognized that the disease runs a very rapid course and in most cases the administration of the serum would be rendered fruitless.

More recently in this country, germ-free extracts (aggressins) have been highly recommended for immunization against blackleg. The products are obtained from animals artificially affected with the disease and the affected muscle and fluids are extracted by pressure. The fluid thus obtained is frozen in order to facilitate the filtration of the liquid. After filtering and suitably preserving, it is marketed, about 5 c.c. constituting a protective dose for each animal. The results from vaccinations with this product are highly satisfactory and no doubt more reliable and uniform than with the blackleg pellets or with the powder. However, the cost for the production of such extracts is considerable and therefore the stock owner, especially since he is accustomed to expend only a nominal sum for the products used heretofore for vaccination against blackleg, would not readily take advantage of this product.

The immunizing action of the extract, no doubt, is dependent upon the specific toxic substances (aggressins) which it contains, and in consideration of the limited amount of such extract which is available from an affected animal the attention of investigators has been directed to the production of such specific toxins (aggressins) in the laboratory; and with this in view, special culture media containing a definite proportion of meat has been inoculated with active blackleg cultures which resulted in a very prolific growth with tremendous gas-formation.

On following this method of cultivation it is noted that in the first few days a very active propagation of the blackleg organisms takes place in the media, further, a disintegration of the meat is noted, and a heavy layer of blackleg organisms settles to the bottom of the container. In the first few days, upon examination, it is found the growth consists of the vegetative forms of the organisms, and with the diminishing of the gas-production, an increase of the spore form of the blackleg organism is noted. The conclusion of the growth is indicated by an entire cessation of the gas, and on the bottom of the container a heavy sediment consisting almost entirely of spores of the blackleg organism is present. At this stage, the meat appears to be disintegrated and becomes of a mushy consistency. For the preparation of the filtrate, the cultures are subjected to various procedures to facilitate the task of filtering out the organisms, since it is absolutely essential that the finished product shall be entirely free from the spores or from the vegetative form of the organism. The technic of this procedure does not require any special skill and consists chiefly of the laboratory routine, employed along the same lines as those used for the production of the different biological products.

This method of procedure has been developed in Japan where at the present time, the germ-free filtrate is used almost uniformly for vaccination purposes against blackleg. From information which I obtained personally from Professor Nitta of the Tokio University it appears that this product is placed above all others which we have at our command for immunization against blackleg, and I have been told that the filtrate appears to afford a uniform protection; and besides this, the losses following vaccination, or incidental to vaccination, are thereby entirely avoided.

In order to determine the value of this method of immunization, the writer undertook investigations along this line and substantiated in every particular the results obtained in Japan. In the course of the experiments, it suggested itself to determine whether other culture media than that described above might be employed for the production of a germ-free filtrate and with this in view duplicate tests were made with culture media—one containing the meat and one without the meat. The results were very convincing as to the necessity of having the meat in the media, since the filtrate obtained from this culture media possessed great immunizing value when tested out on calves, whereas the

filtrate prepared from the media not having the meat failed to show any signs of protection. It was likewise noted that the gas production in the media containing the meat was tremendous, whereas in the other flasks only a moderate gas-formation took place.

In the dosage of the filtrate, the recommendations for the Japanese product were followed, namely,—5 c.c. for immunizing purposes. Since, however, it appears advantageous to reduce the dosage to a quantity which can be more conveniently handled, attempts were made toward concentrating the filtrate. This has been successfully accomplished in vacuum driers without subjecting the product to a temperature exceeding 40°C. The filtrate is then preserved with a definite percentage of glycerin to increase its keeping qualities.

Guinea-pig tests which were at first employed exclusively for the standardization of the product proved that injections of 0.2 c.c., 0.3 c.c., and 0.5 c.c. of the concentrated material when followed in ten days or two weeks' time with an injection of virulent blackleg virus, produced a distinct immunity in the animals, since the control pigs receiving the virus died and the immunized animals survived.

The tests on the guinea-pigs should be carried out as follows:

In all eight quinea-pigs are used of which two serve as controls. Two of the remaining six receive 0.1 c.c.; two receive 0.4 c.c.; and two 0.6 c.c. of the filtrate. After ten days all pigs are injected with 0.5 c.c. of virulent blackleg virus. The virus is prepared by taking dried blackleg tissue, pulverizing it and mixing it with distilled water in such proportions that there will be about equal amounts of fluid and sediment. Of this coffee colored mixture, 0.5 c.c. is injected into each guinea-pig. It is required that at least four of the immunized guinea-pigs should survive and both of the controls should die from the injections.

The product has also been subjected to other severe tests on calves, in which the calves, after injection of the blackleg filtrate were subjected in two weeks' time to an injection of 5 c.c. of blackleg virus, an amount which is used to infect calves with blackleg for the production of vaccine. Five calves which have been inoculated in this manner resisted the infection and only in one instance did a swelling appear at the point of injection of the virus.

With reference to the duration of the immunity produced, all the investigations indicate that the period extends for about one year. That is, the same length of time as the immunity established by vaccine or by germ-free extracts. There is no conclusive information available whereby permanent immunity might be produced from the injection of any blackleg product. Of course, it is realized that the vaccination of calves with an effective product would induce an immunity which would protect the animal during its time of greatest susceptibility, and since the immunity produced by the vaccination vanishes only gradually, the proportion of infection in effectively vaccinated animals would naturally be very insignificant.

SUMMARY. 1. Blackleg filtrate is an effective immunizing agent against blackleg.

2. Blackleg filtrate confers an active immunity, which protects cattle against the disease for as long a period of time as the germ-free extracts (aggressins) prepared from the juices of the tissues from affected cattle.

3. Since it does not contain the blackleg germ in any form it can not produce the disease, therefore losses incidental to vaccination with the powder or pellet form are entirely avoided.

4. Blackleg filtrate may be prepared in a concentrated form and when suitably preserved, will retain its potency for an almost indefinite period of time.

5. It is essential to subject the blackleg filtrate to the various tests for sterility, both during the filtration and filling processes in order to guard against any possible contamination.

—The new Tennessee Serum Law provides that it shall be unlawful for any person, firm or corporation to distribute, sell or use in the State of Tennessee, any serum, virus, or other biological products intended to be used for the treatment or prevention of infectious or communicable diseases among swine unless such serum, virus, or other biological products are prepared or manufactured in establishments located at least eight hundred feet from any public stock yards, garbage disposal, or rendering plant to which garbage or dead animals are hauled over the public streets or highways.

CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."

CLOVER BLOAT

Daniel J. Healy and John W. Nutter
From the Kentucky Agricultural Experiment Station, Lexington, Ky.

As is well known, tympany, or bloating, in cattle may follow the ingestion of certain feeds. A sudden change, after the winter season, from dry feed to a green, succulent feed of any kind may induce bloating. Alfalfa and clover, especially the red and white varieties of the latter while in flower, are particularly dangerous in this respect; turnips, potatoes, and cabbage may induce bloating; middlings and corn meal frequently do so. Grass or clover, when wet with dew or rain or when covered with hoar frost, should be regarded as dangerous.

Symptoms.—As a rule the onset of bloating is rather sudden. The animal is anxious, moves uneasily and is distressed. The swelling of the left flank is characteristic and in marked cases the upper portion of the flank rises above the level of the back, and when struck with the finger-tips resounds like a drum. The breathing becomes more difficult; the animal reels on walking or standing, and in a short time falls and, if not relieved, dies from suffocation.

During the spring of 1913 several cases of bloating occurred in the Experiment Station dairy herd and thus our attention was called to the necessity for further study of the condition. Following the unusual production of clover in the pastures in 1913, the growth of grass in the spring of 1914 was so luxuriant that very little clover appeared and we did not have a single case of bloating in 1914. During the spring of 1915, the clover was again returning and five cases of bloat occurred in the dairy herd. The spring of 1916 presented the banner crop of clover in the pastures, in many cases the clover blossoms at a distance resembling snow. This spring also afforded the greatest number of cases of bloat, there occurring, in all, ten cases in the dairy herd. The first case occurred before the clover blossomed.

We were able to demonstrate that red and white clover blossoms, alfalfa blooms and, in seasons of luxuriant growth, clover

leaves contained sufficient quantities of sugar, and were contaminated with sufficient numbers of either wild yeasts or sugar splitting microorganisms to cause an active fermentation in the rumen of cattle eating heartily of them, and that this process is a true fermentation.

In clover bloat, as in many other conditions, an ounce of prevention is worth a pound of cure. When, in the spring, cattle are first turned on clover or other green feed the change should be made gradually, and this is best accomplished by having the cattle graze for twenty to thirty minutes the first day on pasture and increase this period each day until the digestive organs become accustomed to the green, succulent food. During the early weeks of spring, cattle should not remain in the pasture over night nor be turned on pasture while the dew or frost is on the grass. An excellent practice is to feed cattle a little hay or other dry feed just before turning them on the pasture. Watchfulness during a week or two of early spring will prevent many cases of bloat.

When bloating does occur it may be promptly and efficiently relieved by drenching the animal with one quart of a one and a half per cent solution of formalin in water, at the same time propping the mouth open with a block of wood and, if possible, including gentle exercise. After the animal has recovered, a second drench, composed of one pound of Epsom salts and half an ounce of ground ginger in one pint of tepid water, should be administered. Formalin is a trade name for a 40 per cent solution of formaldehyde gas in water and may be obtained at any drug store. One-half ounce of formalin added to one quart of water makes the proper solution with which to drench the animal.

During the past four years we have used this formalin treatment for clover bloat with marked success. During this period we have had eighteen cases of clover bloat in the Experiment Station dairy herd. Two of these cases died before any treatment could be used. The remaining sixteen cases received the formalin treatment, and fourteen of them promptly recovered in from twenty minutes to one hour. Two of the cases did not recover promptly and were punctured after which they did promptly recover. Two of the cases went off feed and the milk diminished following the clover bloat with formalin treatment, but returned to normal conditions with full milk production after a few days.

In severe cases it becomes necessary to puncture the paunch,

and in such cases the paunch should be promptly punctured. The instrument used for this operation is made in two parts, a trocar fitting within a canula, similar to a sword in its scabbard. This instrument is first sterilized by boiling a few minutes in water containing a small quantity of washing soda, or by immersing in 50 per cent alcohol for 5 to 10 minutes. The sterilized instrument is now boldly plunged through the skin of the animal's left side, midway between the last rib and the hip bone, into the paunch, and the trocar withdrawn from the canula. The latter remains in position and allows the gas to escape from the paunch. This operation will be less dangerous if the animal has been first drenched with the formalin solution. When the animal is relieved the above Epsom salts and ginger drench should be administered.

URETHRAL CALCULUS IN A DOG

H. J. Milks and W. E. Muldoon, Ithaca, N. Y.

Patient was a male Boston bull dog in a more or less emaciated condition.

History. This animal showed much difficulty in urination, and had been running down in condition for some time. He had been treated for the past five months by several veterinarians and physicians without results. Five X-ray plates had been taken of the abdomen and the pelvis but these showed nothing of importance.

Symptoms. The pulse, respirations, and temperature were normal. The animal showed some nervousness and when taken out of doors on a leash would place himself in position to urinate and strain without result, or at times there would be a dribbling of the urine mixed with blood and on some occasions the first few drops would dribble away and after this the urine would pass in a full stream, apparently normal in color.

Diagnosis. The animal was given one-half grain of morphine sulphate subcutem, and one-half hour later placed upon the operating table. The penis was protruded and a small catheter was passed up the urethra until a grating obstruction was met at about the middle of the os penis. A diagnosis of urethral calculus was made and the parts prepared for operation.

Treatment. The skin of the prepuce was shaved and then disinfected with a one to one thousand solution of alcoholic sub-

limate. An incision was made through the prepuce and urethra down upon the calculus which was then removed. This calculus was very rough, about 5 millimeters in diameter and flattened upon one side. The catheter was then passed into the bladder to be sure that there were no further obstructions, and the bladder was flushed out with a four per cent solution of boric acid. The wound was not closed with sutures. For a few days the urine was passed through the incision but on the fifth day the wound was closed and the urine was passed in the regular manner. A catheter was passed daily to prevent stricture and the patient discharged at the end of two weeks.

A PECULIAR CIRCULATORY DISTURBANCE FOLLOWING STRANGLES

R. R. Bolton, Ames, Iowa.

On October 27, 1916, a four year old gray mare was brought to the veterinary hospital for treatment to improve her condition. The mare had been worked hard every day during the spring and summer until about two months previously when she contracted strangles. Since her recovery from strangles a large swelling had remained along the sternum and belly. Now and then large round swellings suddenly appeared over the surface of the body and disappeared after a time.

Symptoms. Respirations 30; pulse 54; temperature 100.9°. Three or four scars remained in the region of the submaxillary lymph glands. Animal very languid and much depressed. Condition poor, hair coat dry, harsh and lustreless. Appetite good. Feces voided in hard, shiny pellets and quite dark. Mucous membranes pale. Extensive non-inflammatory edema along sternum. Carpal joints slightly distended. An examination of the circulatory system revealed the following: mucous membranes pale. Pulse at the mandible regular, with fullness of the artery and strength of the pulse unequal.

Heart impulse regular but unequal in strength. At times the heart impulse was very strong and then became imperceptible. The heart impulse and the pulsation in the mandibular artery agreed in frequency.

A very marked negative jugular pulse was present which extended up the neck along the jugular furrow about three inches from the entrance to the thorax and showed a double undulation at each cardiac cycle.

Auscultation of the heart revealed three heart sounds, the first sound loud and distinct, the second sound doubled into two separate and distinct sounds as lubb-dupp-dupp. After forced and rapid exercise for a few seconds the pulse at the mandible became imperceptible, the heart became bounding at the rate of 102 per minute shaking the thorax and causing an extremely strong impulse on each side of the thorax over the cardiac region. The second heart sound was entirely absent during the bounding of the heart.

The jugular pulse was accelerated and appeared like a tremor in the jugular furrow at the entrance of the thorax.

Respiration was dyspneic, the animal holding the nostrils widely dilated. The heart slowed down very quickly so that both the heart sounds could soon be heard, and as the heart action slowed down the pulse at the mandible became gradually more perceptible.

Diagnosis. Tentative diagnoses were made as follows: 1. Stenosis of the mitral valve. 2. Stenosis of the tricuspid valve. 3. Stenosis of the tricuspid and mitral valves.

October 28, 1916. Respirations 28; pulse 42; temperature 102°. No change in the conditions above described could be noted.

October 30, 1916. Respirations 27; pulse 48; temperature 102.2°. Well defined bolster-like edematous patches, about the size of a man's hand, were present on each side of the neck close to the jugular furrow, on each side of the thorax near the upper part, and on each side in the lower flank region. These were considered as evidences of urticarial eruption. Doubling of the second heart sound could not be heard.

An examination of the blood gave the following: Hemoglobin 45%; erythrocytes 6,072,000; leucocytes 11,333; small mononuclears 0.45%; large mononuclears 17.9%; eosinophiles 2.24%; polymorphonuclears 78.5%; mast cells 0.89%.

October 31, 1916. Respirations 20; pulse 52; temperature 100.4°. The edematous swellings were more extensive, and doubling of the second heart sound was again in evidence.

November 1, 1916. Respirations 20; pulse 47; temperature 100.4°. The edematous patches on the sides of the neck, thorax,

and flank had disappeared. The edema along the sternum still remained, otherwise the condition was unchanged. An unfavorable prognosis was given and the mare was taken home. A request to perform an autopsy at death was granted.

On March 17, 1917 a call at the owner's place found the mare much improved in condition, and doing work every day. The owner stated that she had fully recovered and that her endurance for work seemed fully restored.

POTASSIUM PERMANGANATE AS AN ANTIDOTE FOR THE EFFECTS OF POISONOUS PLANTS

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Bureau of Animal Industry, Washington, D. C.

The treatment of animals affected by plant poisoning with potassium permanganate is very generally recommended in works on veterinary medicine and in publications relating specifically to poisonous plants. This treatment seems to have become established as a recognized routine procedure. It may be well to point out emphatically that, for practical purposes, in the case of ruminant animals,—and ruminants suffer most from poisonous plants,—the use of a drench of potassium permanganate is without value. This was brought out in Bulletin 365 of The U. S. Department of Agriculture, but seems to have escaped general notice, as state bulletins and other publications continue to recommend the use of this remedy.

From the standpoint of the chemist, of course potassium permanganate, tannic acid, or sodium bicarbonate would be logical antidotes for alkaloidal poisoning. These substances are effective, however, only as they come in actual contact with the poisonous substances. In the complicated digestive system of a ruminant, only that part of the drench which passes into the abomasum will be effective: there it may serve as an antidote to the poisonous substance which is passing through that organ. That portion of the drench which passes into the first three stomachs is lost in the mass of organic matter which they contain, and produces little if any effect. It has been shown experimentally that if the antidote is given repeatedly, at short intervals, it is effective, for then it attacks the poisonous substance as it passes through the abomasum.

By short intervals is meant once in thirty minutes or less. Continued treatment of this character is impracticable in most cases of poisoned animals, although it might be used in the case of a single valuable animal.

It may be added that the U. S. Department of Agriculture, as the result of extended experiments on the treatment of animals affected by poisonous plants, has entirely abandoned the use of potassium permanganate, unless, as indicated above, there is an opportunity for continued treatment.

PHENOL POISONING?

R. R. Downing, Wellman, Iowa.

On the evening of April 19th, I was called in haste to see a colt. The owner informed me over the phone that he had just washed the colt to kill the lice. Upon arriving at the farm, instead of finding one colt, I found three down and one standing shivering. My first thought was, a severe chill, but upon close examination, found the following: muscular paralysis; pulse, 75 to 100; respiration, rapid but some dyspnoea; temperature, sub normal and intense pain. I at once began to question my client more closely as to just what he had done and what he had used.

About one year ago he had purchased some Dip of Watkins (Patent Medicine) and it had remained until this time without being opened. He said he used it plenty strong and in cold hard water, after which he rubbed it in with a brush. I then asked to see the container which led to my diagnosis.

On the container was *Shake Well,* which my client did not do, and the composition in part was phenol. I at once decided that phenol poisoning by absorption was the cause.

As Iowa is bone dry there was little chance to get any alcohol, but as this farmer believed in preparedness, we were not long rustling two quarts of spts. frumenti. This I gave in large quantities (to the horses) but as the supply was limited, did not attempt to apply externally.

The owner applied the solution at 4 p. m. and at 8 p. m. one horse died and at 8:05 the second, but the other two rallied and made a recovery. What is the opinion as to my diagnosis and what is the best treatment?

ACUTE HEPATITIS AND NEPHRITIS OF THE HEN

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HISTORY. A single comb white leghorn pullet, a member of a high producing flock bred to lay. Her leg band number was C1.60, spirelette-yellow. She was hatched April 7th, 1916, and began laying at the age of eight months. She had laid 34 eggs up to the time she had taken ill which illness began about four weeks before her death.

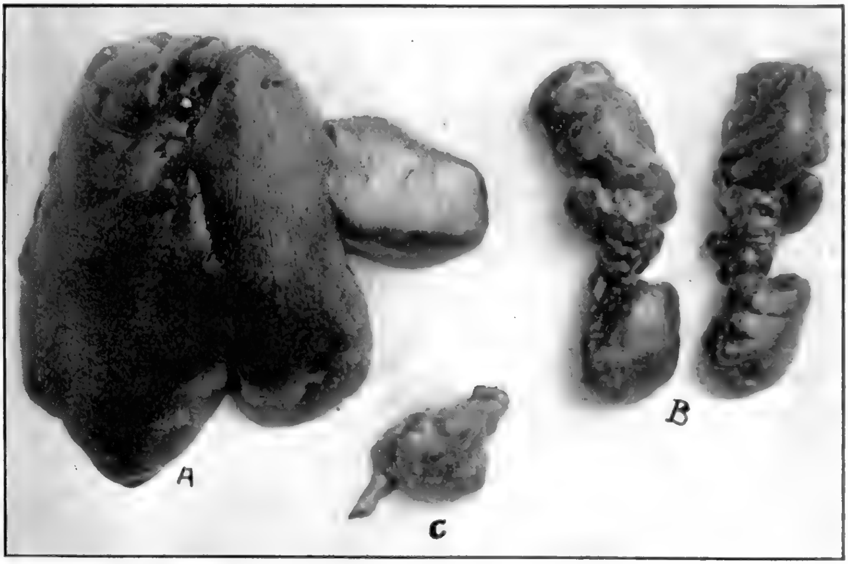


Figure 1. A—Acute hepatitis of a hen. (photograph).
B—Acute nephritis and C—intestinal tumefaction of same.

The first symptom she showed was an unsteady gait. She would sit around much of the time. These symptoms became more aggravated and finally there was inability to properly handle her limbs and somewhat paralyzed floundered around in the coop. She was taken to the hospital and died on March 25th, 1917.

PROTOCOL. Autopsy—The vent feathers were somewhat smeared indicating some diarrhea was present. This discharge was of a greenish-yellowish fluid nature.

The comb and unfeathered portions were purplish, other-

wise appearing normal. The plumage was in an unkempt condition. The carcass was thin in flesh.

Upon opening the abdominal cavity the liver was noted to be enlarged with grayish mottled patches over it. The liver weighed 170 grams or 5 times its normal weight. The gall bladder was distended with a light watery appearing bile—quite unnatural in its appearance.

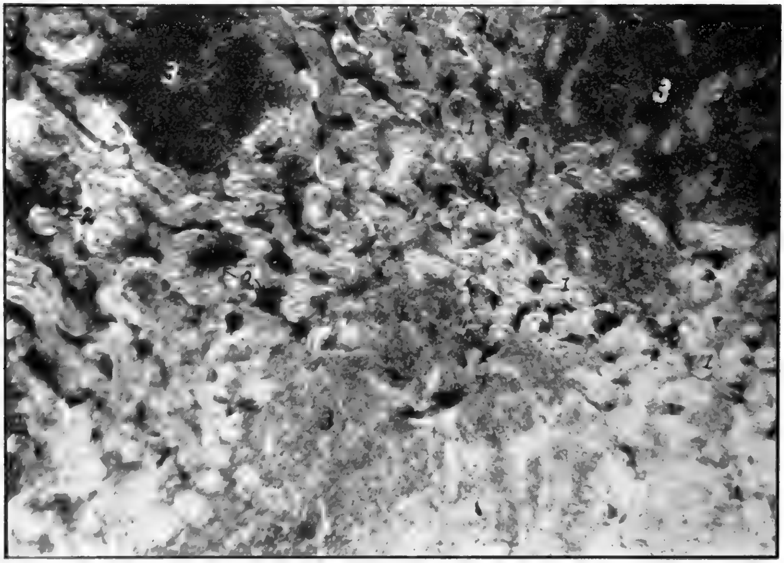


Figure 2. Nephritis of a hen. Photomicrograph of a section from Figure 1. letter B.
1—The tubules.
2—The congested vessels.
3—Cellular infiltrated areas.

There was an absence of abdominal fat. There was a tumor on the free portion of the small intestines which measured 3x2x1½ mm. in its three diameters. The intestine at this point had slightly ruptured and a round worm (a male ascaris inflexa) was visible in the tumefaction, but further examination was deferred till the specimen had been hardened in formalin solution.

Figure I, letter A, shows the liver with its mottling indicating the cellular infiltrated areas. Letter C is the tumefaction removed from the intestinal wall. At I can be seen the worm partly protruding through a tear in the mass.

The kidneys were greatly enlarged, the anterior lobe being the larger. Figure I, letter B, shows the right and left kidneys, respectively, the anterior lobe being uppermost. The cellular infiltrated areas can be noted in the cut as mottled areas.

The kidneys appeared mottled gray, similar to the liver and both kidneys weighed 49 grams.

MICROSCOPIC STUDY. Sections were made from the tumefaction and stained in hematoxylon and eosin and clarified in beech wood creosote for study. This mass was made up of delicate connective tissue septa the acini thus formed being packed with mononuclear and polymorphonuclear leucocytes most of which possessed nuclei with chromatin net knots stained very deeply, making it appear somewhat like the first stages of caryorrhexis.

Similar sections were studied from the kidneys. There were found islands and tracts infiltrated with similar cells as those found in the tumefaction. The cells of the tubules were granular and in a high state of albuminoid degeneration and their nuclei almost without fail showed the same characteristic nuclear staining as in those of the tumefaction from the intestine. The cells of many of the convoluted tubules had separated from their base and the lumen had become obliterated, the cell mass pushing to the center. Some cells had lost their nuclei and were in a state of necrosis. In fact there were all stages of cloudy swelling on to necrosis. The glomerules were congested and shrunken—a state of glomerulitis. We therefore found a state of nephritis involving both glomerules and tubular portions. The vessels were congested, this held good for those of the cortical as well as those in the medullary portions.

Sections of the liver similarly prepared showed cellular infiltrated irregular areas in just the same manner as the kidney. These areas were infiltrated with similar cells being mononuclear and polymorphonuclear, principally the latter. Both active and passive congestion were present. The chromatin net knots took deeply the basic stain similar to those of the kidney and tumefaction of the intestines.

Figure number 2 shows a photomicrograph of a section through the kidney substance. This was from near the outer portion. Number 1 shows the tubules. Number 2 the congested vessels. Number 3 are the areas infiltrated with cells.

A similar case was later studied in another pullet from this same flock. The gross studies and the microscopic studies were the same with the exception that the liver weighed 352 grams (the normal weight of the average liver of a hen is approximately 35 grams) and the two kidneys weighed 54 grams.

SUMMARY. Two cases of acute hepatitis and nephritis, both in association with each other, were studied in two single comb white leghorn hens.

In these cases the livers and kidneys were greatly enlarged.

The outer surface of the organs in cases of acute hepatitis and acute nephritis presents a mottled whitish appearance.

LEUKOMA IN A DOG

H. J. MILKS AND W. E. MULDOON, Ithaca, N. Y.

Patient was a well nourished, spayed, Airedale bitch, about one year old.

HISTORY. The animal had recovered from an attack of dog distemper some two months previously, leaving no noticeable sequelae.

SYMPTOMS. The pulse, respirations, and temperature, were normal and nothing out of the ordinary noted except a marked cloudiness of the cornea of the left eye. On close examination of this eye no wound, scar, or ulcer could be found that would give rise to this opacity. The cloudiness covered the entire cornea and was of such a degree that the sight was entirely destroyed. The right eye was normal.

DIAGNOSIS. A diagnosis of Leukoma was made and the following treatment followed:

TREATMENT. The eye was washed with a boric acid solution for two days and a few drops of a five per cent solution of silver nitrate instilled twice daily. From the third to the ninth day a one-fourth grain tablet of dionin was powdered and placed into the eye, after washing with boric acid solution. At the end of this time the opacity had entirely cleared up and the eye had apparently returned to normal.

ABSTRACTS FROM RECENT LITERATURE

Post Mortem Lesions. Canis Major. *Veterinary Record.*— 1st Case. A cocker spaniel bitch was destroyed on account of bad habits. The bladder was found containing a calculus weighing nearly one ounce. The animal had never shown any signs of illness during her life.

2nd Case. Brindle bull dog had the appearance of a very sick animal. Its skeleton was prominent, the frontal muscles had almost disappeared. It was reported as having always had a good appetite. Destroyed; the post mortem revealed the presence of a large, flat cork, one of the pickle bottle variety, which was wedged in the pylorus.

3rd Case. Aged fox terrier destroyed on account of age and infirmities. The post mortem revealed: a diseased spleen. At the margin of the organ, there was a tumor, about two ounces in weight and similar in its substance. These when examined were found to be spindled celled sarcoma. The dog had lived long and was comfortably healthy all the time, except for some two years previous, when the owner had thought he had some internal growth.

4th Case. Irish terrier puppy. Damaged by a motor car had complete paralysis of the head and neck. Prognosis unfavorable. He was destroyed. Fracture of the odontoid process of the axis was found with bone loose.

5th Case. Cat had been ill for a few days and was destroyed. Post mortem showed purulent peritonitis. A growth involving the mesentery and a perforation of the cecum, evident cause of the peritonitis. The liver was studded with small abscesses.

6th Case. Old cat, an old patient, treated many times for inability to retain food. He was very much emaciated. Post mortem exhibited an enlarged cirrhotic liver with disease so far advanced that it was difficult to cut into the organ.

Liautard.

Entero-Hepatitis or Black-Head in Turkeys. Charles H. Higgins. *Bulletin 17, Dept. of Agriculture, Canada.*—Most of the theories in regard to the cause, nature and course of the disease are familiar. The post-mortem findings are characteristic. Muriatic acid has been found useful in treating the disease. A teaspoonful of the acid (Acid. Mur. Dil. B. P.) is used in a quart of drinking water placed in a porcelain or glass vessel. Three times

the amount of acid may be used for the first three days when the birds are severely affected. Acid is used because of the increased alkalinity of the digestive tract during the course of the disease.

Black-Head is prevented by artificial incubation and by isolation of the birds. Plots of one acre were alloted to about 25 turkeys. The plots are separated from each other by lanes so that separate flocks cannot come in contact with each other or other animals. Colony houses are built on each plot and given the best possible conditions. Plots are so arranged that attendants cannot pass from one directly to the other and thus carry infection. Special attention is given to the food of the poults. Strict sanitary precautions are taken in respect to the colony houses. All refuse is burnt as near the shelter as is safe to prevent infection being carried. Five per cent crude carbolic acid in hot lime wash or Cresol Compound U. S. P. in hot lime wash are good disinfectants and should be applied to all parts of the house. Strict watch is needed that infection is not carried from infected houses to poults by wearing apparel of the attendant. HAYDEN.

TORSION OF THE UTERUS IN A SLUT—HYSTERECTOMY—RECOVERY. Mr. Cholet. *Bullet. de la Soc. Cent.*—A four year old pointer was found to be pregnant, but the time of her delivery was not exactly known. After a time she had pains, her appetite diminished, the vulva had not changed. There was no discharge, the abdomen got large and painful on pressure. The milk secretion stopped. The author was called and after examination per vagina made the diagnosis of distocia of mother origin, with metroperitonitis.

Laparotomy was urgent and after proper preparation, anesthesia with atropo-morphine and chloroform with injection of physiologic serum, the abdomen was opened, a sero-bloody fluid escaped and the uterine horn was found gangrenous. There was local peritonitis and the gravid horn was adherent to the tissues surrounding. While freeing it, it was torn, and a dead fetus came out. The left horn was thus made empty, but the right contained two fetuses. It was twisted, having made a half turn drawing the left and it was that twist which had prevented the delivery and as the twisting of the uterus could not be relieved the broad ligaments were ligated; the uterine body secured with a clamp and amputated. The abdomen was washed with physiological serum, the

sero-muscular wall was closed with silk, the skin with Florence thread. Warm water bottles, blankets, injections of caffeinated physiological serum with careful diet were followed by cicatrization, partly by first intention and in other areas with suppuration and, after fifteen days, recovery. LIAUTARD.

RABIES. CARPANO (Matteo). Su di un metodo rapido di colorazione dei corpi di Negri nella rabbia e sulla speciale struttura che si mette in evidenza col metodo stesso. (A Rapid Method of Staining Negri Bodies and the Special Structure of these Bodies brought out by this Method). *Clinica Vet.* 1916, June 15-30, Vol. 39, Nos. 11-12, pp. 347-359. (Reprint).

The following technique for staining Negri bodies is recommended by Carpano. Smears fixed in Zenker's solution or absolute alcohol or sections imbedded by the acetone method, or, better, after fixing in Zencker's fluid by the usual methol, are stained with a combination of Eosin-crystalviolet.

Three staining solutions are necessary:

1. EOSIN.—Eosin red (ethyl) or, better, eosin yellow......1 gram
   Distilled water ....100 c.c.
2. CRYSTAL VIOLET.—Crystal violet ....1 gram
   Alcohol (95 per cent) ....20 c.c.
   Dissolve and add a solution of 2 per cent phenol in distilled water 500 c.c.
3. IODIN.—Iodin ....1 gram
   Potassium iodin ....2 grams
   Distilled water ....400 c.c.

The directions for staining are as follows:

1. Ten drops of solution 1 are placed on the smear or section for about one minute, poured off and without washing are passed into 95 per cent. alcohol.

2. The moist slide is then covered with about 10 drops of crystal violet solution 2, the preparation is warmed until vapors begin to rise, for about five minutes.

3. This stain is poured off the slide and without previous washing a few drops of solution 3 are put on and left for one minute.

4. The last solution is then also taken away and the preparation decolorized in 95 per cent. alcohol until the violet color has almost disappeared.

5. The preparation is quickly dehydrated in absolute alcohol, clarified in xylol and mounted in balsam.

Beautiful preparations which show remarkable structural differentiation of the Negri bodies can thus be obtained. Carpano describes definite growth and evolution of these bodies. For details, those interested are referred to two very interesting plates.

K. F. Meyer.

Visceral Pseudo-Tuberculosis and Caseous Adenitis in Swine. Dr. P. Chausse. *Recueil de Med. Vétérinaire.*—There are frequently in swine glandular caseous lesions with the form of nodules from visceral tubercles, which it is difficult to distinguish from true tuberculosis. From a few clinical observations which are recorded, the author shows that there are frequently in swine nodular caseous growths which are not tuberculous and which it is difficult to distinguish from true tuberculosis. The following characters will help to make the distinction: Nodules that are not tuberculous are not regularly spherical, they have no fibrous envelopes; their caseification is complete and uniform with calcification. They are of a color of putty or greenish.

In the lesions due to Koch's bacillus, on the contrary, the nodular form is rare in the lymph glands of swine. If the tuberculous lesions are several months old, the viscera are involved in the generalization, while in pseudo-tuberculosis they are not or exceptionally so. If pseudo-tuberculosis and true tuberculosis exists in the same animal, the diagnosis may be difficult but the detection of the second affection is sufficient. Lesions of pseudo-tuberculosis are easily distinguished from the parasitic tuberculosis of the liver, echinococci and cysticerci.

Liautard.

Providing Meat for Paris in 1870 and in 1914. G. Moussu. *Recueil de Médécine Vétérinaire,* Vol. 92, pp. 224-229, 1916.—We ought to profit from past experiences. I will state what happened in 1870, under conditions comparable with those that face us now. The concentration of live stock into the capital began in September 1870. By October 4, there were 40,000 cattle, 220,000 sheep and 12,000 hogs in the parks. These figures may look big, but this was an extremely small reserve for the enormous daily needs of Paris. By the end of November, 1870, the reserve had been exhausted or the little that remained was set aside for hospital use exclusively.

Disease depleted the herds in Paris. This was a depreciation factor which apparently had not been considered by those charged with the grave responsibility of provisioning for a siege. This

disease factor is an invariable one in all great concentrations of live stock; it has occurred at all times and among every people; it is this alone which condemns the principle of permanent parks for raising cattle. Scientific progress has today placed other means at our disposal. Foot and mouth disease decimated the cattle; sheep pox (clavelèe) made terrible inroads upon the sheep in spite of rapidity of slaughter and vaccination (12,000 were saved out of 30,000 vaccinated).

In December, 1870, it became necessary to eat horse flesh. Out of 75,000 horses then in Paris, 70,000 were slaughtered; i. e., the entire Parisian cavalry. This was easy in view of the fact that forage, oats, etc., for the horses were lacking. By January 1, 1871, the rations of horse flesh had been reduced to 40 grams per person (2 ounces). Paris succumbed to a famine.

Economists have indicated over 15 years ago that we ought to profit by the discoveries of Ch. Tellier, and construct refrigeration plants in which slaughtered meat shall be stored in reserve in quantities proportionate to the number of population and for whatever length of time the reserves are to last. Have the lessons of the past been of any use to us?

The German armies in 1914 were precipitated toward Paris with such momentum that had they not been retarded by the Belgian forts, they would have arrived at the capital before the parks could have been stocked for the maintenance of the calculated number of cattle. If the siege had begun in September, the situation would have been no better than it was in 1870.

If one sums up the expenses of construction of parks for live stock, the losses due to diseases, accidents, depreciations, etc., which represent only the inevitable losses, one arrives at figures which permit the construction of store houses more than sufficient for the preservation of all the meat furnished by the herds of Paris. And these warehouses would represent stable values which would not depreciate after the war since they could continue to be used for the storage of numerous foods. BERG.

AN UNUSUAL CASE. J. Wilson Barker, M.R.C.V.S. *Veterinary News.*—The case was observed in a horse, 4 years old. He presented an abnormal condition of the fore limbs and presented the condition known as "Knock-Kneed". Sometimes while standing, the off knee was brought across the near one. The animal

could trot and gallop sound when out at grass. Under the saddle he trotted and walked sound, rarely stumbled.

After a thorough examination, no heat and no splint were found. There was a bony enlargement above the knee and one below on the outside of the metacarpal bone. The feet were in good condition. The horse brushed badly on the near hind leg. He ate and masticated slowly. His mouth and teeth were in good order.

The writer asks the cause of the condition of the fore limbs. Is it osteoporosis? It is hard to answer. LIAUTARD.

A NEW DEFECT IN MILK CAUSED BY BACTERIUM LACTIS AEROGENES ESCHERICH. Max Duggeli. *Zeitschrift für Gärungsphysiologie,* Vol. 5, No. 5, pp. 321-340, 1916. *Abst. from International Rev. of The Science and Prac. of Agric.,* Year VII—No. 9, Sept. 1916, p. 1363.—The writer received for examination 2 samples of bottled milk suffering from an hitherto unknown and very pronounced defect, although the samples reached the laboratory only 48 and 60 hours after milking. They came from a model cow-house of 36 cows producing best quality milk, obtained and handled with the utmost cleanliness, afterwards filtered, cooled to 12-14°C., and bottled for forwarding to the consumers. When the milk from this shed had been kept for some time, a bitter taste was observable, together with a typical rancid smell, especially noticeable when boiling the milk; and this fault became more strongly pronounced as the time of keeping was lengthened.

All attempts to discover the presence of bitter substances failed.

The ration of the cows was made up of good hay and crushed barley, not very fresh it is true, but of normal bacteriological composition. On studying the fresh milk of the 36 cows separately no result was obtained, but by keeping the different specimens of milk it was detected that the defect was due to one cow with a diseased teat, an old animal which had been in milk for a year and a half.

A thorough bacteriological study of the above 2 specimens of milk was made, all kinds of cultures being prepared. The writer succeeded in isolating a bacterium belonging to the group *Bacterium lactis aerogenes* Escherich, but differing from the stock form of Aerogenes, and he considers this to be the cause of the defect in

question. It not only gives rise to abnormal smell and taste in the milk, but also possesses the property of making glucose bouillon very ropy. Furthermore, even in the presence of *Bacterium Güntheri* L. et N., it prevents the coagulation of the milk. On cultivating the bacterium producing the defect in question on lactose agar, the characteristic taste and smell disappear, but they can be made to reappear in part by afterwards cultivating the bacterium in a suitable medium (decoction of teat substance).

REICHEL.

GANGRENOUS MAMMITIS IN CATTLE. J. H. Ripley, M.R.C.V.S. *Veterinary Journal.*—As soon as diagnosis was certain, chiefly by noting the thin, bloody fluid obtainable from the teat in conjunction with the general symptoms of septicemia, some five or six deep, narrow incisions were made into the udder substance by means of an abscess knife. These incisions were 2 inches deep but only large enough to admit the nozzle of a syringe with which the wounds were syringed three times a day with hypochlorous acid solution. The next day, the punctures were enlarged and eventually by joining one to another a long incision was formed. Adhesions of the gland to the skin were easily broken down with the fingers and such bleeding as took place was stopped by plugs of tow soaked with the solution and oil. Continued syringing of the wounds with the solution while turpentine was given internally completed the treatment. The dead gland substance sloughed out and healing followed. The important point in the treatment was to allow active interference to be made early and a lot of manual manipulation in getting the gangrenous gland away were avoided.

LIAUTARD.

TUBERCULOSIS OF HOGS. John R. Mohler and Henry J. Washburn. *Farmers Bulletin 781, United States Department of Agriculture.*—Several localities during recent years show a decrease in the number of swine having tuberculosis, but the country at large shows an increase in the number affected. Tuberculous cattle are the principal source of tuberculosis in hogs. The disease is transmitted readily by feeding hogs on unpasteurized dairy products and by allowing them to follow tuberculous cattle in the feed lot where the undigested grain in the droppings is eaten. Hogs are slaughtered young and do not propagate the disease among their own kind to any extent. Of the number of hogs slaughtered in

one city only 2.4% showed tuberculous lesions. These animals were not fed on uncooked dairy products or behind diseased cattle. In the same period the records of four other cities show that from 9% to 25% of the hogs killed had tuberculous lesions. These animals were fed uncooked dairy products or fed behind diseased cattle. Virulent germs of tuberculosis were recovered from separator slime taken from one of the creameries of this region. Hogs are bought by many buyers subject to post-mortem inspection.

Milk and feces from tuberculous cattle are unquestionably the cause of the vast majority of cases of tuberculosis in hogs. Tuberculous sows may infect their litters. Separator sediment taken from 15 different creameries showed virulent germs of tuberculosis in 500, 33 1/3% of the samples. Tuberculosis in hogs can be greatly reduced by creameries being compelled to properly heat their skimmed milk before it is distributed to farmers. Several instances of tuberculous hogs have been traced to infection through feeding on tuberculous carcasses or slaughterhouse offal. No case of tuberculosis is shown to have arisen from the consumption of tankage and it is thus held as a safe and valuable food for swine. Sterilized garbage can be fed to swine with safety and is of great economic value. Uncooked garbage is a source of danger. It is established that hogs may contract tuberculosis through eating the sputum of consumptives. Eating the carcasses of tuberculous fowls also causes the disease.

Intestinal tuberculosis is frequently accompanied by general disturbance of the digestive functions, and diarrhea or constipation may be shown. Advanced cases of the lungs are shown by a persistent, dry, harsh cough and rapid breathing. The cough can not be distinguished from that caused by lungworms. Lameness as a result of disease in the bones and joints is comparatively rare. No symptoms are shown in the majority of cases. The intradermal method of applying the tuberculin test may be used to test hogs. Two-thirds of the volume of tuberculin used in cattle testing is evaporated and two drops of the preparation are injected into the skin at the base of the ear. A swelling, which may remain for 10-12 days, is formed at the end of 48 hours and is proof of infection. Lesions are found most frequently in the throat, bronchial and intestinal lymph glands, liver, lungs, spleen. Lesions occasionally occur in other parts of the body. Lesions of the kidney are extremely rare, only 3 cases in 120,000 tuberculous carcasses

examined. Preventive measures entail the removal of all affected animals, thorough disinfection of the premises, pasteurization of all milk products used for feed by heating to 145°F. for 30 minutes or to 176°F. for a moment, the location and removal of all centers of infection, and spreading information among farmers and dairymen. The extermination of hog tuberculosis is held to be practicable and relatively easy. HAYDEN.

FROZEN MEAT FOR THE CIVIL POPULATION. G. Moussu. *Revue d'Hygiène et de Police Sanitaire*, Vol. 38, pp. 883-892, 1916. On account of the scarcity and prohibitively high cost of meat, it has become necessary for the government to provide a meat supply for the people.

What is frozen meat? It is fresh meat that has been subjected to a temperature of minus 15° or 16°C. and thoroughly frozen, hard like stone or wood. In this condition it may be kept for months or even years, provided that after being frozen, it is kept in rooms at minus 7° or 8°.

Meat that has been chilled at 0° to 2° may be kept for 3 or 4 weeks; this is known as refrigerated meat. England was the first European nation to make use of meats preserved by refrigeration. She has established supply stations along her navigation routes at Gibraltar, Port Said, Hong Kong, etc., so that her ships can be revictualled wherever they may happen to be. England's successful prosecution of the Transvaal campaign was due in part to the abundance of frozen meat supplied to the army and Russia's failure in the Russo-Japanese war was due in part to a faulty organization which did not provide for proper rations.

Because of lack of a reserve supply of storage meat it was necessary, during the first year of the war, from August 1914 to July 1915, to kill large numbers of cattle, both large and small. After a year of war, the number of cattle in France had diminished by more than 2½ million adult head, out of a total effective number of 15 million (young and adult). In 1915 we were poorer in cattle than in 1862.

Should it be necessary to continue the losses of cattle in the same proportion, then cattle raising in France is to-day ruined for a long time and the revictualling of the army and the civil population is irremediably compromised. Various practical difficulties and lack of cooperation between large meat dealers and the govern-

ment make it advisable that municipal meat markets be established for the sale of meat at cost. The military administration is in a position to put a certain amount of frozen meat before the civil population; not for the purpose of totally supplanting the fresh meat, but to correct the present high price of fresh meat.

(Details are given regarding the procedure involved in thawing frozen meat so that its appearance shall remain attractive to the consumer). BERG.

SUDDEN RENAL HEMORRHAGE IN A STEER. Mr. Piot Bey. *Recueil de Médécine Vétérinaire.*—A fifteen year old steer, kept at rest for five days, had general shivering, fell down and died.

The post mortem revealed that all the visible mucous membranes were pale and the abdomen filled with a large clot of blood through the intestinal circumvolutions. This clot ran upward toward the sublumbar region. Rupture of a large blood vessel was evident. After removal of the intestines the right kidney was reached. Its capsule was enormously distended by a clot of blood. There was at its posterior extremity a laceration through which the blood had escaped into the abdomen. It was at the end of this extremity that the hemorrhage started. All the other organs were healthy. The cause of the hemorrhage was determined by the examination of the kidneys. LIAUTARD.

SOME OBSERVATIONS ON THE METHODS OF USING THE AGGLUTINATION TEST IN THE DIAGNOSIS OF DISEASE IN BOVINES CAUSED BY THE BACILLUS OF CONTAGIOUS ABORTION. H. R. Seddon. *Proc. Roy. Soc. Victoria (N. S.), Part II, 1914.*—To found a diagnosis of contagious abortion the materials which may be examined are vaginal or uterine exudate after parturition, foetus or foetal membranes, blood serum, and milk. The agglutination test alone was applied to the whey of milk. In addition to the regular bacteriological methods the agglutination and complement fixation tests were applied to the exudate. Whey was used in a large number of experiments but no conclusion was reached as regards the limiting titres for diagnosis. Whey is a possible material for diagnosis. Of serum taken from ten different steers only one sample agglutinated. The complement fixation method was also positive when applied to that sample. The bacterial emulsion was standardized with barium chloride and sulphuric acid in a weak solution, the so-

lution being made up of 3 c.c. of 1% barium chloride and 97 c.c. of 1% sulphuric acid in water. The agglutination reaction is not simply a matter of dilution but a quantitative reaction for the author's tests shows that the dominating factor is the quantity of serum used and not the dilution. The quantities of emulsion and of serum combining to produce agglutination bear a direct relationship to each other. There is also shown to be a partial inhibition of agglutination with certain proportions of emulsion and serum. With greater or less proportions agglutination may occur. This is an important phenomenon in that the progress of the animal may be compared from time to time.

The optimum amount of emulsion to use is 0.05 c.c. of the author's "Standard 10X" emulsion because it gives a marked naked eye deposit when positive, a definite cloudy appearance when negative, the reaction is complete in 24 hours when the total volume of fluid in the tube is anything from 1½ to 20 c.c., and it is the minimum amount of emulsion that will answer the author's requirements of a good reaction. HAYDEN.

—A glowing tribute was paid to Dr. Francis X. McGuire of the hospital staff of the British Remount Commission at Newport News, Va., April 21. The occasion was the presentation of a handsome silver service as a wedding gift. The presentation also included two beautiful silver vases for the bride elect, Miss Madeline James of Newport News. The presentation was made by Dr. Gregg on behalf of the staff and Dr. McGuire responded with a most appropriate speech. A silver presentation was also made by Major Barry who spoke of Dr. McGuire's long and honorable connection with the depot.

—Dr. Anderson Crowforth of Lockport, N. Y., who suffered from a bite of a rabid dog last December and received the Pasteur treatment, has published in his local paper a communication of much interest and value for laymen. Two cases of rabies in dogs were found in Lockport during the month of April.

—A report from Fort Riley, Kans. states that Major William V. Lusk has received advices from Washington that two thousand veterinarians are needed for the reserve army at once.

ASSOCIATION MEETINGS

AMERICAN VETERINARY MEDICAL ASSOCIATION

REPORTS OF RESIDENT SECRETARIES

Colorado

During the past year little of special interest to the veterinary profession has transpired in Colorado.

Hog cholera seems to be fairly well under control and is not giving us the trouble that it has during the previous few years.

Excepting very isolated cases glanders is unknown.

An occasional outbreak of anthrax has occurred in the Arkansas Valley, but nothing of a serious nature.

Blackleg seems to be on the increase, occurring often following single vaccination. In these cases double vaccination appears to control the disease.

Hemorrhagic septicemia, which has previously been almost unknown in Colorado, has broken out in a few herds near Denver with a considerable loss in some instances. Vaccination has been quite successful in controlling the outbreak.

Contagious abortion is probably causing us more trouble than any other disease and as a consequence the Station has entered into an investigation of the problem as it especially concerns this state. It is proposed to test a large number of animals, using the serum tests in order to determine the actual prevalence of the disease. It is hoped that control measures may be satisfactorily applied. The practicing veterinarians are using some vaccine, and are having fair results with carbolic acid and methylene blue treatments. However, it is not the consensus of opinion that there has been developed any satisfactory method of handling this disease.

We have a very peculiar problem in that thousands of sheep are fed during the winter months for spring markets and each year the loss in feed lots is something enormous. It is estimated that 5,000 sheep were lost in the San Luis Valley alone during last year, and as many more were lost in the yards in Northern Colorado, and probably an equal number in the Arkansas Valley. From such observations as we have been privileged to make during the past ten or twelve years, it appears to be a feeding problem. A more thorough investigation will be made of the difficulty with a view of outlining methods of prevention.

Larkspur continues to extract its toll from the livestock industry and many cases of actual poisoning, due to this weed. have been investigated by the Experiment Station veterinarians.

The State Association is gradually increasing, both in membership and interest shown.

We have to record the death of Dr. T. H. Quinn of Greeley, who died in Cheyenne about the first of August, and, until his death, was an active member of both the Colorado and the American Veterinary Medical Associations.

I. E. NEWSOM.

IDAHO

There is little progress in the veterinary profession, worthy of note, to report from the State of Idaho. The graduate veterinarians of Idaho all seem to be doing a fairly prosperous business. The main obstacle they have to contend with at the present time is a set of empirical state officials. It so happens that we have a non-qualified, non-graduate state veterinarian and naturally most of his deputies are of the same class. One of the things the state veterinarian has been doing to antagonize the good work of qualified men of the state is permitting the entrance of dairy cows into the state without a tuberculin test. Formerly it was necessary for all cows entering the state to have a tuberculin test. This care together with the wonderful healthful climatic conditions and range life for the cattle has had the tendency to prohibit a greater than two or three per cent of tubercular cattle. Allowing these cattle to come into the state without a tuberculin test is bound to result in an increase in the number of diseased cattle and thus injure the dairy industry for which Idaho seems so well adapted.

Quarantine work for contagious diseases has been sadly neglected by our state officials and as a result hog cholera has raged in many parts of the state during the past year. Best results are reported where there is established infection by using the simultaneous treatment. The veterinarians have had some interference in this work, however, by the state official interfering with the importation of good serum and virus and trying to force them to use the serum manufactured at a non-licensed plant.

During the past year the sheepmen of the state have been particularly prosperous owing to high priced wool and mutton. Idaho having had so much free summer range has been one of the heaviest sheep producing states in the Union. However, the open range

is getting smaller every year on account of cattle men and homesteaders who are taking up this land. This is making feed for the sheepmen less plentiful and stockmen predict that sheep will never again be as cheap as they have been in the past.

We have forty graduate veterinarians registered under our new veterinary practice act. Thirty are members of the Idaho Association of Veterinary Graduates and fifteen are members of the A. V. M. A. J. R. FULLER.

ONTARIO.

As Resident Secretary for the Province of Ontario, I am glad to be able to report that although there has, during the past year, been an unprecedented movement of United States transit horses for export from the Atlantic seaboard to Europe, there have not been any serious outbreaks of contagious disease.

It has been necessary to unload these horses for feeding and resting purposes at three central points in Ontario, and these operations have been very carefully supervised in order that suitable measures could be taken should disease be detected. At one of these points a few cases of glanders were found. The testing of all contacts and the prompt slaughtering of the affected animals, together with the systematic disinfection of the yards, chutes and corrals prevented any serious trouble developing. There was a fair percentage of cases of shipping fever, which unfortunately always accompanies the movement of susceptible horses. This disease, however, has been practically limited to these shipments, and has not developed into an epizootic among Canadian horses. There is no doubt that this satisfactory state of affairs has been the result of the careful and effective measures which were promptly put into force by the Veterinary Director General when these shipments commenced to come through this country.

Glanders has not been detected in this province to any extent for many years, and there is, therefore, every reason to believe that Ontario is practically free from it.

There have not been as many outbreaks of hog cholera as in the previous year, and those which have occurred have been in districts where uncooked garbage has been fed.

Sheep scab has not been detected for many years in this province, while mange in horses exists only to a very limited extent, and mange in cattle is practically unknown.

There are no statistics which would give a reasonably accu-

rate idea as to the number of cases of bovine tuberculosis in Ontario. Generally speaking, the attitude assumed by stockmen in this province with regard to this disease is not as favorable for the enforcement of effective control measures, as in some of the other provinces of the Dominion. Although the Federal Government passed a Tuberculosis Order a few years ago providing for assistance to municipalities desiring to obtain their milk supply from tuberculin tested cattle, there is not so far one city or town in Ontario which has taken advantage of this very beneficial legislation.

A very few outbreaks of anthrax have occurred, and these have been reported on previously infected premises. These outbreaks are promptly attended to by the Veterinary Inspectors of the Health of Animals Branch, and the owner is advised to vaccinate all contact stock with vaccine prepared at the Biological Laboratory, Central Experimental Farm, at Ottawa.

There has been the usual number of cases of blackleg, but as stockmen have for many years been vaccinating their young animals, the number of fatalities has not been abnormal.

Cases of actinomycosis are reported from all parts of the province.

Serious losses have been experienced from time to time in outlying districts from contagious abortion. This disease is receiving special attention from the officers of the Health of Animals Branch, and one of its pathologists is devoting a great deal of time in research work in connection with it.

Swamp fever has been more or less prevalent in uncultivated low-lying districts.

Joint Ill in foals has also caused a great deal of worry and trouble to the veterinary practitioners located at breeding centers. As many veterinarians are on active service in Europe, the work of the private practitioner has proportionately increased.

Meat inspection is dealt with under the Meat and Canned Foods Act, which is enforced by the Health of Animals Branch of the Department of Agriculture. This, however, deals only with establishments whose business extends to other provinces or to points outside the Dominion. There are eighteen abattoirs in this province in which government inspection is maintained.

During the last few years an increased interest has been taken by municipal authorities with regard to milk inspection.

The majority of municipalities have some sort of milk inspection. Unfortunately, however, this does not go far enough, and is limited to the enforcement of sanitary measures. There is not, so far as I am aware, any municipality in Ontario which requires that milk shall be sold only from tuberculin tested cattle.

While, fortunately, the live stock situation in this province has been very favorable during the past year, I regret very much to report that there has been no improvement in our veterinary legislation.

There are in this province three veterinary associations, the Central Canada with headquarters at Ottawa, the Ontario, of Toronto, and the Kent, Essex and Lambton with headquarters at Chatham. These associations have been united in their efforts, in the last few years, to obtain better veterinary legislation. Two years ago a veterinary bill was drafted, printed and distributed among veterinary practitioners in this province. Copies of this bill were forwarded to the provincial authorities, together with a largely signed petition, and Dr. Grange's assistance was asked for and obtained. Although an extra effort was made to have this bill favorably considered by the Legislature, that body has not so far seen fit to take any definite action with regard to it. This was a very great disappointment to the veterinary profession, as although Ontario is the most important live stock province in this country, it has, with the exception of the Provinces of New Brunswick and Prince Edward Island, the most unsatisfactory veterinary legislation of any province in the Dominion. While Ontario is a most favorable field for veterinary work and is the only province in Canada where a government owned veterinary college is maintained, the present act only provides for the penalizing of individuals who assume the title of Veterinary Surgeon, or any abbreviation thereof. As the other provinces, with the exception of New Brunswick and Prince Edward Island, have adequate veterinary legislation, Ontario is practically the only province which is overrun with unqualified men. It is a well-known fact that there are more unqualified men practising in Ontario than in any other part of Canada.

There is also an institution located at London, which has thrived owing to this unsatisfactory state of affairs. This institution, in spite of the fact that the Ontario Veterinary College is owned by the government, is distributing its fancy so-called di-

plomas steadily and advising its so-called graduates that they can practice in Ontario without fear.

In this connection I might state that I have had the pleasure of forwarding over forty applications for membership to the American Veterinary Medical Association, of which number more than thirty were from veterinarians in the Province of Ontario. I am quite satisfied that the large number of applications was largely the result of the feeling among the veterinary profession in Ontario that it is most desirable to become associated with responsible veterinary bodies in order to receive proper recognition. I think I am voicing the sentiments of the profession when I say that veterinarians in Ontario will remain united until suitable legislation is obtained, and the so-called London Correspondence School is far removed from the borders of this province.

I was very glad to be able to forward to Dr. O. A. Longley, Chairman of the Emblem Committee, suggestions for an emblem, one designed by Dr. E. A. A. Grange, of the Ontario Veterinary Association, and one designed by Dr. C. H. Higgins, of the Central Canada Veterinary Association. GEORGE HILTON.

WASHINGTON

There is not much of interest to report from this state this year. The growing use of the automobile has brought about a great change in veterinary practice in the western part of the state and some change in the eastern part. West of the Cascades, dairying is rapidly supplanting the lumbering business on all the low lands. On the high land the logging is nearly all done with steam power so that equine subjects are not nearly so numerous as they were a few years ago. East of the Cascades there is more interest in the stock raising and horse using industries though the automobile is widely used.

During the past year the state department of agriculture has done a large amount of work in the eradication of tuberculosis from the dairy herds of the state. Our last legislature appropriated $25,000.00 to be used for this purpose. It was not enough but the commissioner in charge realized this from the start and proceeded accordingly so a great deal was actually accomplished with it. A report setting forth the work is to be published soon. It is hoped that the next biennium will see more appropriated and more accomplished. This was the first move of the kind made in this state and it has been a good one.

Interest in association work is about as usual with a few dropping out and younger men taking their places. We had this year the unusual experience of having every attending non-member at the annual state meeting come into the association before he went home and one who could not be present sent in his application by telegraph.

Not all members of the state association are members of the A.V.M.A., but each year sees more of them coming into line.

We are still troubled with a few unqualified practitioners in Washington though we have a practice law that has operated to keep out a large number and has had a wholesome effect on any would-be's.

The bulk of the practice is with the non-contagious diseases as injuries, accidents, obstetrics and digestive troubles. In the eastern part of the state the digestive troubles run largely to impactions while in the western part they run largely to hyperacidity and fermentation. This may be partly accounted for by the fact that east of the Cascades the soil and water carry a good many alkaline elements while west of the Cascades they carry little or none.

Among the contagious diseases tuberculosis, as has already been indicated, has received a good share of attention. Many infected herds have been cleaned.

Rabies that was giving so much trouble in the vicinity of Seattle and Tacoma some time ago is coming under control.

Hemorrhagic septicemia appears to be somewhat on the increase, probably due to the increased number of dairy cattle kept in enclosed pastures.

Verminous bronchitis in calves is also probably increasing. Though the most of the victims survive they suffer greatly and sustain a considerable loss in flesh and strength. More pastures seem to become infested each year.

Hog cholera appears occasionally but is thought by many to be in a less virulent form than that met in the corn belt. The herds are small as a rule and rather widely separated so that the difficulty of controlling them is not so great as in some sections of the country.

Contagious abortion is with us. Dairymen seem to be coming to realize that eternal vigilance and cleanliness is the price of keeping clear of it.

Aside from the contagious diseases mentioned above there are a few worthy of mention in this report.

In the valleys lying between the Cascade mountains and the Columbia river in this state there is a condition of new born animals known locally as "big neck". They come weak or dead with no hair on part of the body and with greatly enlarged thyroid glands. It affects all kinds of live stock if the mothers are there during the full term of pregnancy. No wholly satisfactory form of treatment has been found though some of the sodium and calcium salts have been used with apparent benefit.

A spinal meningitis of horses that appears to be a form of forage poisoning was particularly troublesome during the last fall and winter months. It usually appears in August and September of dry years and again in December, January and February. On this year a similar condition has appeared in cows in some localities. In the cow it is sometimes very difficult to distinguish from milk fever in the first stages. In both species saline purgatives are used early with fairly good results.

CARL COZIER, M. D. C.

SECRETARY'S OFFICE

1827 South Wabash Avenue, Chicago, Ill.

DO YOU SEE YOUR PLACE IN THE NATIONAL DEFENSE?

As the American nation has a just cause to be proud of its people by the way the leaders of industry and commerce have responded to the government's appeal for co-operation in the vigorous prosecution of the war, let every veterinarian see to it that ours is not the one industry that lags behind.

Remember, that men who put national service, of whatever kind, above personal interests during days like these, by placing their knowledge and their skill at the command of the government, leaving all selfish interests in the background, make up an aggregation that spells victory for the nation and honor for themselves.

It is our duty to flag, to country, to home, to profession and to self to improve our collective efficiency by means of a powerful and highly active organization and then to offer its services to the government, promptly, ungrudgingly and enthusiastically. Railway men, manufacturers, merchants, engineers, physicians and others are doing this. What of the veterinarians who fail to support their organizations?

Program of the Annual Meeting

While the finished programme will not be published until the July issue we are submitting herewith a draft of the general plan of the five days' ceremonies together with the numerous papers already offered.

Opening exercises.......................Monday morning, August 20th.
Section work (three sections) ....Monday afternoon.
Entertainment by Local Committee ....Monday evening.
Section work (two sections).........................Tuesday morning.
Business session and election of officers..............Tuesday afternoon.
Reception ....Tuesday evening
Pathological exhibit and luncheon at Kansas City abattoirs
Wednesday forenoon and afternoon.
Meeting of the alumni associations.................Wednesday evening
Section work (two sections).........................Thursday morning
Symposium on animal parasites (joint session) ....Thursday afternoon.
Banquet ....Thursday evening
General Session for unfinished business and surgical clinic
Friday forenoon and afternoon

Contributions reported to this office to date are:—

Vesicular Stomatitis...................J. R. Mohler, Washington, D. C.
Parasites of Sheep......................A. D. Knowles, Missoula, Mont.
Parasites of Swine.......................W. Lester Hollister, Avon, Ill.
Parasites of Cattle.....................Seymour Hadwen, Agassiz, B. C.
Parasites of Dogs..........................M. C. Hall, Detroit, Mich.
Parasites of Solipeds.........................C. P. Fitch, Ithaca, N. Y.
Some of the Problems in the Control of Tuberculosis of Animals
Jacob Traum, Berkeley, Cal.
Advantages of Testing Pure Bred Herds......S. H. Ward, St. Paul Minn.
The Reliability of the Tuberculin Test
C. J. Marshall and H. W. Turner, Harrisburg, Pa.
Coital Exanthema ....Hal Simpson, Denison, Ia.
Sterility of Mares......................F. F. Brown, Kansas City, Mo.
The Abderhalden Test in the Breeding of Animals..C. A. Zell, Chicago, Ill.
Some Original Methods, Instruments and Operations
Wm. M. Bell, Nashville, Tenn.
The Handling of Dogs...............Arthur Trickett, Kansas City, Mo.
Contagious Abortion (Title to be announced).W. L. Williams, Ithaca, N. Y.
Surgical Treatment of Sterility.............W. L. Williams, Ithaca, N. Y.
Securing Cows for Udder Operations...........J. P. West, Madison, Wis.
Fistulae of the Withers..........................H. E. Bemis, Ames, Ia.
Some Hernia Operations..............George B. McKillip, Chicago, Ill.
Special Procedure for Side Bones.......L. G. Hart, Chippewa Falls, Wis.
Illustrated Lecture on the Distribution of the Median Nerve
Jos. Hughes, Chicago, Ill.
Extraction of Molars under "nerve blocking" anesthesia
H. E. Bemis and L. A. Merillat

A New Operation for Recto-vaginal Fistula..R. C. Moore, St. Joseph, Mo.
Operation for Roaring by Special Technique. John Adams, Philadelphia, Pa.
Studies in Blackleg Immunization........A. Eichhorn, Pearl River, N. Y.
The Regulation of the Production and Sale of Veterinary Biological Products by the Bureau of Animal Industry
J. R. Mohler and A. R. Ward.

Secretary Munce of the Section on Sanitary Science and Police promises additional papers on glanders, hog cholera and anthrax by reporters not as yet selected. There are also some contributions to be added to the symposium on parasitism of domestic animals for Thursday afternoon, and also a number of additions to the section programs.

This thorough review of parasitism by field men who have had a wide experience features the programme this year because its importance is becoming more and more apparent to the live stock industry and especially because it offers such vast fields for investigation. Following the traditions of the A. V. M. A. to dig into the problems of the day the section officers have done well to undertake a systematic study of this important subject, and its presentation in this detail should appeal alike to all sanitarians and practitioners.

The Army Service Committee

Dr. N. S. Mayo represented the Secretary's office at a conference of the Army Service Committee with the Council of National Defense held at Washington, D. C., Sunday, May 13th. The untiring efforts of this committee to obtain satisfactory conditions in the army for the veterinarian (although heretofore unannounced to the membership) is one of the commendable enterprises of the moment, launched into timely activity by our far-seeing President during January, before war was declared. To show the government the needs of a highly efficient veterinary service and to obtain for those who enlist a befitting rank, pay and allowance are among the functions. The personal sacrifices of the members of this committee, in time and money, is a display of patriotism and devotion to the profession that should inspire all to give a helping hand by joining the association.

Rumors that the annual meeting will be postponed on account of the war are unfounded, as this year above all others is one during which the meeting is of great importance. There are so many things to do for the country and for the profession, no matter

how many of our members should be called to the front, that no justification could be found for such a decision.

L. A. Merillat, Secretary.

NEW APPOINTMENTS

The special committee of the A. V. M. A. on Army Veterinary Service has been enlarged by the appointment of the following: L. H. Howard, Massachusetts; H. E. Bemis, Iowa; D. S. White, Ohio; A. T. Kinsley, Missouri; S. H. Ward, Minnesota.

Dr. L. Van Es, of North Dakota, has been appointed to the Committee on Intelligence and Education, five-year term, in place of Dr. Ward, resigned.

Charles E. Cotton, President.

KEYSTONE VETERINARY MEDICAL ASSOCIATION

The regular monthly meeting of the Keystone Veterinary Medical Association was held in the Chamber of Commerce, Widener Building, on Tuesday evening, May 8th, 1917, at 8:30 P. M. Had an exceptionally big attendance.

The program for the evening was:

The relation of the Dairyman, the State Sanitary Board and the Veterinarian in the matter of the Tuberculin Test, by Dr. Thomas B. Rogers.

A New Treatment of Wounds and Burns by Dr. C. H. Campbell.

The use of the Stomach Tube on Horses, by Dr. William G. White.

Dr. T. W. Munce and Dr. Malcolm J. Harkins were elected to membership in the Association.

Meeting adjourned at 11:30 P. M.

C. S. Rockwell, Secretary-Treasurer.

OKLAHOMA STATE VETERINARY MEDICAL ASSOCIATION

The second annual meeting of the Oklahoma State Veterinary Medical Association was convened at the Lee Huckins Hotel, Oklahoma City, May 3rd, 1917, at 9:00 A. M.

This association is the outcome of a consolidation of several local, conflicting organizations, which had attempted to serve the

purpose of veterinary association in this state during the past years. Last year through the untiring efforts of Dr. J. S. Grove, Chief Inspector of the Bureau force at Oklahoma City, and Dr. R. F. Eagle, the enterprising veterinarian who is now General Manager for Wilson & Company and who is probably the highest paid veterinarian in the world, working solely for the uplift of the live stock interests, brought these conflicting organizations together, held a good meeting last July and organized a strong, enthusiastic association that is destined to serve the needs of the state in this connection.

The officers of the association elected at that time and all of whom were re-elected at this meeting are: J. S. Grove, president; J. E. Nance, vice-president; R. C. Smith, secretary; C. C. Hooker, treasurer; L. D. Brown, D. W. Gerber, and W. H. Martin, executive committee.

A survey of the crowd in attendance showed a notable gathering of upward of one hundred veterinarians from the state and the following visitors from remote places: D. M. Campbell, Editor American Journal of Veterinary Medicine, Chicago, Ill.; Adolph Eichhorn, Pathologist of the Lederle Laboratories, Pearl River, N. Y.; J. R. Mohler, Assistant Chief B. A. I., Washington, D. C.; R. F. Eagle, Manager Wilson & Company, Chicago, Ill.; A. T. Kinsley and S. L. Stewart, Kansas City Veterinary College, Kansas City, Mo.; R. C. Moore, President of the St. Joseph Veterinary College, St. Joseph, Mo.; H. Jensen of the Jen-Sal Laboratories, Kansas City, Mo.; and L. A. Merillat, Secretary of the American Veterinary Medical Association, Chicago, Ill. As each of these were active participants in the program the character of the meeting was of the highest order.

The following papers were read and discussed:

Business Methods—D. M. Campbell, Chicago, Ill.

Veterinary Biological Therapy—A. Eichhorn, Pearl River, N. Y.

Tuberculin Testing—A. T. Kinsley, Kansas City, Mo.

Equine Pneumonia—R. C. Moore, St. Joseph, Mo.

Navel Ill—S. L. Stewart, Kansas City, Mo.

Scrotal Hernia and Castration—L. A. Merillat, Chicago, Ill.

Sodium Bicarbonate, Camphor and Lobelia—H. Jensen, Kansas City, Mo.

Equine Influenza—H. W. Ayers, Oklahoma City.

Animal Parasites—E. A. Pembrooke, Stillwater, Okla.

Production and Distribution of Clean and Wholesome Milk—L. L. Lewis, State College, Okla.

Needed Legislation—C. R. Walters, Oklahoma City.

Sanitary Problems—J. R. Mohler, Washington, D. C.

These papers together with the banquet program consumed the time of four day sessions and two evening sessions. The program of the banquet, which proved to be a very sumptuous occasion as well as a patriotic demonstration, was as follows:

Toastmaster—Mr. Ed. S. Vaught, President Chamber of Commerce, Oklahoma City.

Conservation of Livestock.—Hon. Paul Nesbit, Speaker, House of Representatives of Oklahoma.

Elevation of the Profession—D. M. Campbell.
American Veterinary Medical Association—L. A. Merillat.
Preparedness—A. T. Kinsley.
U. S. Bureau of Animal Industry—J. R. Mohler.
Therapeutics—H. Jensen.
Co-Operation—Hon. John Fields.
Reminiscences—R. F. Eagle.

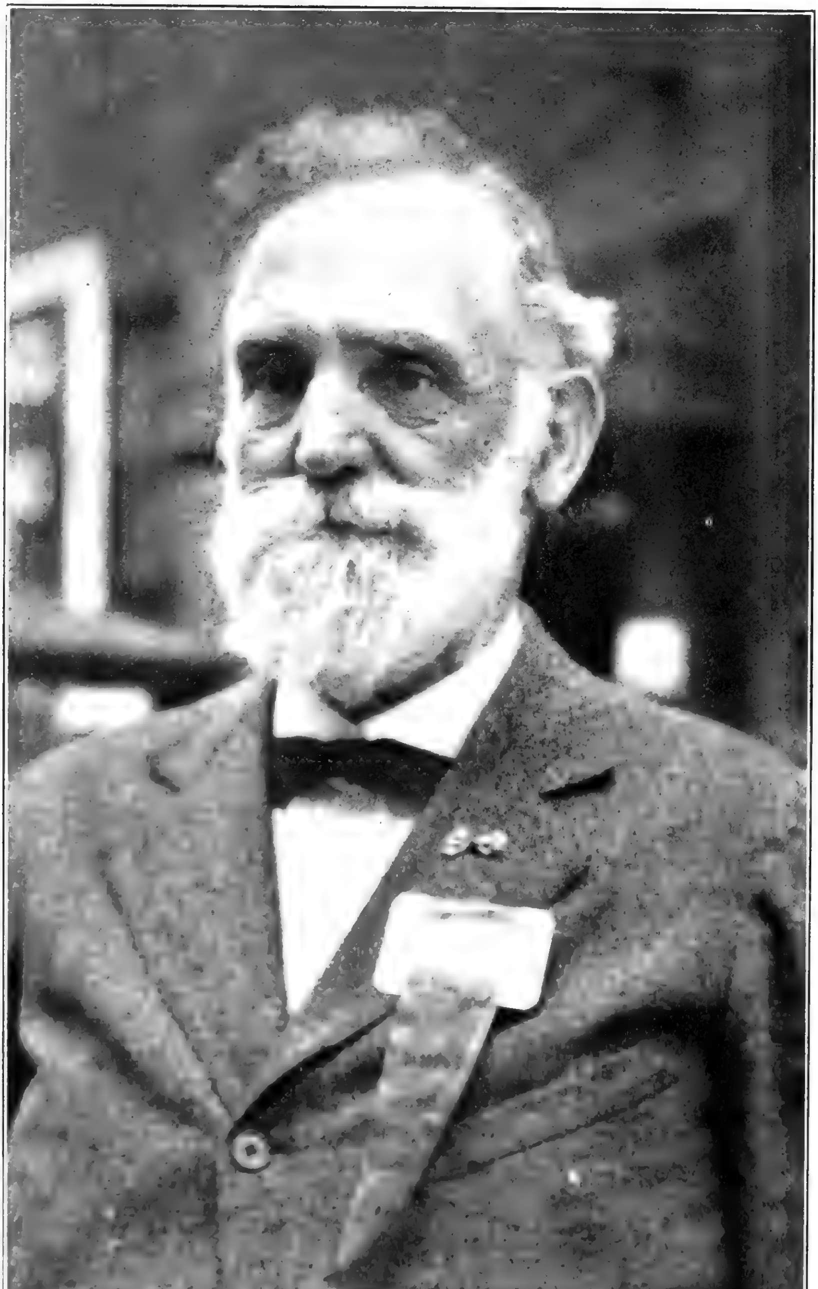
Every one of the toasts were responded to in the patriotic vein seriously calling attention to the duty of every man to his country, during the approaching days of "who knows what". But it was left to Dr. Jensen to display the only simon pure spread-eaglism of the occasion in an address from which Patrick Henry might have taken a cue. L. A. M.

HUDSON VALLEY VETERINARY MEDICAL SOCIETY

This society held a very successful meeting May 2, at Catskill, N. Y. A large number of interesting cases were reported by various members. This form of meeting met with the approval of the members and it was moved and carried that the same kind of a meeting should be held next time. Senate bill No. 2081 was discussed and it was regularly moved and carried that this society should indorse it. The bill has already passed the senate.

The next meeting will be held August 1, at Chatham, N. Y.

W. H. Kelly, Secretary.



Dr. Cooper Curtice

TESTIMONIAL TO DR. COOPER CURTICE BY THE SOUTHERN CATTLEMEN'S ASSOCIATION

One of the particularly pleasing features incident to the annual meeting of the Southern Cattlemen's Association in Atlanta, April 4-6, 1917, was the testimonial banquet given by a number of veterinarians and others engaged in tick eradication work, to Dr. Cooper Curtice, who discovered the life cycle of the cattle fever tick and demonstrated the possibility of eradicating the ticks.

That work was done in Henderson County, North Carolina, while he was employed by the State in the years 1889 and 1890, and his methods were adopted later by the U. S. Bureau of Animal Industry.

Dr. J. A. Kiernan served as toastmaster and opened the flow of oratory following a feast of good things to eat by saying: "We are here to pay homage to the empire builder of the South. I was one of the first men transferred to Dr. Curtice's force in the year 1906 when the Government inaugurated its tick eradication campaign and made him inspector in charge of tick eradication work in the South, with headquarters at Lynchburg, Virginia. I did not have so much faith in the work then as I have now, but studied the subject carefully and got a lot of inspiration from Dr. Curtice."

Dr. Kiernan then introduced Dr. Tait Butler, who followed Dr. Curtice as State Veterinarian in North Carolina in the year 1891, who said: "As long as veterinary literature lasts, two pieces of work done by Dr. Curtice will stand out in history; establishing the life cycle of the cattle tick, and of the ox warble. It is given very few men to do things that will live long after they die. I would rather have accomplished either one than occupy the highest position in a nation."

Dr. C. A. Cary: "I do not believe there is any permanent immunization of cattle for tick fever. A large per cent of the pure bred inoculated cattle died when I had that work to do in my official capacity and I nearly lost my reputation as a veterinarian. Later I tried tick eradication methods recommended at that time by our friend, Dr. Curtice, which consisted of picking off ticks and greasing cattle. That was awful. We had to approach the people on the blind side of tick eradication by talking

agriculture primarily. Introduction of dipping vats and arsenical solution have solved the problem.

"If the Texas cattle owners had fallen into line 10 years ago and their representatives in Congress had been willing to block interstate shipment of tick infested cattle, the time of country-wide tick eradication work would have been cut in half and we now would be diverting our time and energies to some other phases of live stock sanitation."

Dr. E. M. Nighbert: "My first experiences with cattle ticks were years ago when my father bought 'Southern Cattle' for fattening on cheap corn in the early days in Illinois. However, they were bought late in the fall season and the fat ticks dropped off into the snow and froze to death, so there were no serious losses from tick fever and no parasites reproduced to get on our stock the following spring.

"I was one of the original men assigned by the Bureau of Animal Industry to work with Dr. Curtice, in 1906, after an appropriation had been obtained from Congress. I had been in the employ of the Bureau of Animal Industry some time as a line rider to protect the quarantine line and to supervise interstate movement of cattle at certain seasons of the year, having headquarters at Lynchburg, Virginia.

"The big problem then as well as at the present time, was the people. The early investigators had to work single handed, and Dr. Curtice deserves that much more honor for what he accomplished. I consider that he is responsible for the release of every county which has been released from tick fever quarantine."

Every person gathered around the banquet table made a few remarks on the subject and Dr. Curtice was called upon to tell of some of his struggles and achievements, from his viewpoint. He said in part:

"There were very few supporters of the movement for a long time and practically no funds with which to work. The fertilizer tax in North Carolina furnished limited funds for an educational campaign which was conducted, without which it is doubtful if tick eradication work would have made much progress. Education has been the instrument that moved things. Heart to heart talks hit the nail on the head. One fertilizer manufacturer supported the work because he wanted the farmers to make money on their cattle so they could pay their fertilizer bills.

"The possibility of eradicating ticks was demonstrated in the years 1889 and 1890, but as you know, it was a long time before the Government was convinced of its practicability sufficiently to make an appropriation for carrying on the work. In the meantime the agitation was continued and a few loyal supporters to the movement enlisted, including Dr. Tait Butler, who followed me as State Veterinarian in North Carolina. You all know the progress that has been made since the first appropriation of $82,500 was made by Congress. Some of you may not know that this was made over the protest of the then Secretary of Agriculture, James Wilson, who refused to recommend it, as he was not convinced of its practicability. Later he was a very enthusiastic supporter of the work.

"I am glad that I have been permitted to live and see results. I want to live long enough to see two more projects worked out: eradication of tuberculosis in cattle; and sheep diseases:"

After Dr. Curtice had organized the tick eradication work the Bureau transferred him to investigational work which was more to his liking. He had charge of the milk production experiments carried on in Florida which demonstrated that a light infestation of ticks on cows reduced the milk production at least 18 per cent and a heavy tick infestation reduced the milk production as much as 44 per cent. He now is studying sheep diseases and parasites, under direction of the Bureau, on a farm near Washington.

The closing number on the program was the presentation of the following testimonial signed by every one present, each standing as it was read and handed by Dr. Nighbert to Dr. Curtice:

"In recognition of the great service to this Nation by Dr. Cooper Curtice, in his persistent research and discovery of the life cycle of the cattle fever tick (*Margaropus annulatus*), which made possible the complete eradication of this tick from all communities working in co-operation with the cattle owners, counties, State and Federal Governments, which means the development of the cattle industry to an extent that would not have been possible under tick infestations, and which has been an important factor in developing the agriculture of those states, we take this opportunity of expressing our appreciation of his great contribution to the welfare of mankind."

Replying with much feeling, Dr. Curtice said: "Gentlemen, my only regret tonight is that Mrs. Curtice cannot be present to

hear your kind words of commendation of my work, and the reports of great progress that is being made in freeing the infested states of the cattle fever ticks. I thank you from a full heart.''

Following are the names of those present, in addition to the guest of honor: Dr. J. A. Kiernan, General Supervisor of tick eradication in the South for the Bureau of Animal Industry, Birmingham, Ala.; Dr. E. M. Nighbert, Inspector in Charge, tick eradication work in Florida for the U. S. Bureau of Animal Industry, Jacksonville; Dr. Wm. Burson, Professor of Veterinary Science, College of Agriculture, Athens, Ga.; Dr. R. M. Gow, State Veterinarian for Arkansas, Little Rock; Dr. W. E. White, Camilla, Ga.; Dr. B. B. Flowe, State Veterinarian for North Carolina, Raleigh; State Representative Lee Cazort, Little Rock, Arkansas; P. N. Little, Live Stock Inspector for Georgia, Lawrenceville; Dr. P. F. Bahnsen, State Veterinarian for Georgia, Atlanta; Dr. Harry C. Hutchins, Assistant State Veterinarian for Georgia, Atlanta; Dr. J. A. Barger, Inspector in Charge of tick eradication work in Mississippi for the U. S. Bureau of Animal Industry, Jackson; Dr. E. P. Yager, Inspector in Charge of tick eradication work in North Carolina for U. S. Bureau of Animal Industry, Washington, N. C.; Dr. R. E. Jackson, Inspector in Charge of tick eradication work in Alabama for U. S. Bureau of Animal Industry, Birmingham; A. A. Coult, Educational Director for the Florida Cattle Tick Eradication Committee of the Southern Settlement and Development Organization, Jacksonville; Dr. W. K. Lewis, Inspector in Charge of tick eradication work in South Carolina for the U. S. Bureau of Animal Industry, Columbia; Dr. A. E. Wight, Inspector in Charge of tick eradication work in Arkansas for the U. S. Bureau of Animal Industry, Little Rock; Dr. C. A. Cary, State Veterinarian for Alabama, Auburn; Dr. G. E. Nesom, in charge Live Stock Extension Work for U. S. Bureau of Animal Industry, New Iberia, Louisiana; Dr. Tait Butler, Editor Progressive Farmer, Memphis, Tenn.; Dr. W. P. Ellenberger, Tick Eradication Division, U. S. Bureau of Animal Industry, Washington, D. C.; Dr. Wm. M. MacKellar, Inspector in Charge of tick eradication work in Georgia for the U. S. Bureau of Animal Industry, Atlanta; Dr. Hartwell Robbins, Veterinary Inspector in tick eradication work, Atlanta; and Dr. H. A. Hirleman, Veterinary Inspector in charge of hog cholera control in Georgia for the U. S. Bureau of Animal Industry, Atlanta. A. A. Coult.

WEST VIRGINIA VETERINARY MEDICAL ASSOCIATION

The West Virginia Veterinary Medical Association met at Parkersburg, April 4th, on call of its president, Dr. Bradley. Dr. S. E. Hershey acted as secretary in the absence of Dr. E. Layne. The purpose of the meeting was to discuss subjects for the betterment of the profession in the State, and make arrangements for their regular meeting which is to meet the first week in July. This association was organized in 1900 with eight graduates, all who were in practice in the State at that time. Dr. S. E. Hershey acted as secretary for the first eight years, then was president for a term of six years, and in that time the membership grew to fifty-six members. At the next regular meeting it is hoped to add at least six more members, as that many new men have graduated from the different colleges this year and located within our State. We hope to get every graduate to join our Medical Association.

S. E. HERSHEY, *Acting Secretary.*

MASSACHUSETTS VETERINARY ASSOCIATION

The regular monthly meeting of the Massachusetts Veterinary Association was held at the Quincy House, Boston, on Jan. 21, 1917. President Peirce presided.

The minutes of the December meeting were read and approved.

As announced previously, the principal speaker was Dr. Langdon Frothingham, of the Harvard Medical School, who spoke on the subject of "Dogfish". His remarks brought out many interesting facts, among which the following are excerpts:

That the dogfish are really small sharks, that there are 180 varieties of such sharks. Speaking of dogfish, he stated that there were two kinds, the so-called smooth and spiny. The spiny form is viviparous, whereas the smooth form is oviparous. The smooth form is the one which is used for food.

Regarding the objection to the use of this fish as food, Dr. Frothingham spoke of the fact that he knew of no reason for the same, inasmuch as they are extremely tasteful and nourishing. Most of the prejudice against the same must be attributed to ignorance. In this respect, he spoke of the time when shellfish would not be eaten, and of the time when halibut were considered as unfit for food. These fish are now called "deep sea whitefish", and

"grayfish", in an effort to overcome this prejudice. Also, the government is endeavoring to make a market for the same, as they did with tilefish, and that many concerns are being established for canning this fish. The prediction was offered that after this prejudice was overcome, the dogfish will be as popular as any other. There is no question of this particular fish being a nuisance, particularly to fishermen, because they spoil large numbers of nets and traps. Inasmuch as they are extremely strong, they tear the strongest nets. It is estimated that the loss to Massachusetts fishermen from destruction of traps and nets is at least $160,000 yearly, and that the loss from other fish eaten by the dogfish is at least $250,000. Dr. Frothingham's remarks comprised one of the most interesting addresses which we have heard for sometime. This was undoubtedly more so on account of the fact that the large majority of us were listening to a subject which we desired to know something about, but on which the majority of us had not the slightest information. A rising vote of thanks was extended to Dr. Frothingham at the completion of his remarks.

The following gentlemen were elected to membership: Dr. John H. Gardner, Wollaston; Dr. Charles W. Delano, Boston; Dr. Herman H. Delano, Jr., Boston.

The secretary spoke of the need of revising the constitution and mentioned the fact that there had been so many amendments to the constitution that it was almost impossible to intelligently interpret the meaning of it. He moved that a committee of three be appointed to revise the same and report to the association. Seconded by Dr. Frothingham. Carried.

Dr. Sturges showed the tongue from a pig which had died suffering with necro-bacillosis infection, which was followed by considerable discussion.

Dr. McAllister, of Lee, chairman of the legislative committee, read several bills which are before the legislature, and which he thought would be of interest to the veterinarians. These were discussed at considerable length. Dr. Howard spoke of the bill which has been introduced calling for the increase in the appraisal for cows condemned on account of tuberculosis, and asked for opinions from those present. Considerable discussion followed, and it seemed to be the consensus of opinion that the appraisement should be increased.

The secretary asked for instruction as to what course he should pursue regarding the money previously voted by the association for the Belgian Relief Fund. He stated that the money was voted with the understanding that it would be forwarded when called for by Dr. Ellis, former Editor of the American Veterinary Review, which is no longer in existence, or when other subscriptions should be made for the same fund, none of which had been noted. It was moved that the secretary investigate the matter further and report back to the association. Adjourned at 7:30.

EDWARD A. CAHILL, Secretary.

SOUTHEASTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

The second regular meeting of the Southeastern Michigan Veterinary Medical Association was held at the Griswold Hotel, Detroit, on the afternoon of April 11, 1917. Twenty members were present. Four applications for membership were accepted, bringing the roll of the association up to thirty-one members.

Among the questions discussed was the character of the programs for future meetings. In order that the association might be of the greatest good to the greatest number, it was agreed that each member should contribute something to the program of at least one meeting during the year.

A campaign for new members was undertaken, with the object in view to have every eligible veterinarian in Wayne, Macomb and Oakland counties become a member of the association. Every eligible veterinarian who was not a member, about twenty in number, was assigned to a member of the association for the purpose of getting him into the organization.

A question box proved to be a very profitable part of the program. The balance of the afternoon was spent in discussing the treatment of calk wounds, bruised knees, internal abscesses following influenza, and canine distemper.

The next meeting will be held in Detroit, on the afternoon of July 11, 1917. H. PRESTON HOSKINS, Sec'y-Treas.

—Dr. C. W. Clark has removed from Hagerstown, Ind. to Park Falls, Wis.

—Dr. H. W. Bates of York, Ala. has removed to Mobile, Ala.

COMMUNICATIONS

Editor Journal of the American Veterinary Medical Association:
Ithaca, N. Y.
Dear Sir:

The following is an urgent request from the Southeastern States Veterinary Medical Association sent to each member of the executive committee.

RESOLUTION

Whereas, the A. V. M. A. has held but one session in the South, since its organization and whereas the veterinary profession in the South is anxious to have the privilege of entertaining this organization, be it

Resolved, that the Southeastern States Veterinary Medical Association in regular annual meeting assembled, urge the A. V. M. A. to hold its 1918 meeting in the city of Atlanta, Ga. Nothing that the A. V. M. A. could do would have a more uplifting influence on the profession in the South than to grant this, our urgent request.

Motion was made that the Secretary send a copy of the resolution inviting the A. V. M. A. to hold its 1918 meeting at Atlanta, Ga., to the Executive Committee of the A. V. M. A.

Yours very truly,

G. A. ROBERTS, Sec'y.

REVIEW

CITY MILK SUPPLY

HORATIO NEWTON PARKER

Formerly Health Officer of Montclair, New Jersey, lately instructor in Municipal and Sanitary Dairying at the University of Illinois. Member of the International Association of Dairy and Milk Inspectors.

First Edition—McGraw-Hill Book Company, Inc., 239 West 39th St., New York.

In this book the author approaches the milk problem from a little different angle than has been presented in previous publications on this question. The volume seems fully adapted to a study of the milk question and should be a valuable reference book on account of the very complete bibliography on this subject and a large amount of data and information pertinent to the milk business.

The writer's experience as a Health Officer and teacher has brought him in contact with many phases of the milk question. As Health Officer of one of the cities of the United States that has paid as much attention to the milk problem as any municipality in the country, he has had an opportunity to compile data that can be presented in a very logical and useful way.

The first chapter deals especially with the composition, chemistry and bacteriology of milk.

The second chapter discusses the various animal diseases that are communicable through milk, a short description of various diseases, a discussion of tuberculosis and the tuberculin test and other diseases of animal origin. This chapter outlines work that has been done by several authors in a summary way, giving tables and data that have been compiled by various authorities. The second part of this chapter deals with diseases of human origin that may be transmitted through milk by various means and infection, an interesting discussion relative to the various channels of infection and the control of milk-borne diseases and the infection of milk supplies.

The third chapter discusses the various breeds of dairy cattle, the care and housing of animals, barn construction, etc. The more recent work that has been done relative to controlling the spread of various infectious diseases through the medium of poorly constructed stables, the work of detecting open tuberculosis in dairy herds by means of the sputum cup and some of the more recent work along these lines is not referred to.

Under the heading "Sanitary Milk Production" in chapter four, the author considers the various questions entering into the production and handling of clean milk and the effect on the bacteria count of various methods of handling the product, the scoring of dairies and the cost of milk production. This latter question of course varies according to the supply and demand of dairy feeding stuffs, as well as supply and demand in the milk market.

Under chapter five, the various methods of distribution, cost of hauling, the use of motor trucks, etc. are discussed. Cost figures covering these operations are incorporated. Many interesting illustrations in this chapter give an idea of the various conditions under which milk is handled. There are also presented tables showing the relation of proper cooling and low temperatures to bacteria counts.

Chapter six deals with the milk contractor or the milk buyer, a new phase in the literature aside from the daily press and agricultural weeklies, and a considerable portion of the volume is devoted to a discussion of this part of the industry. A great many suggestions are brought out that are of interest and show the figures relating to the various operations in the handling and distri-

bution of milk. These figures, of course, vary in accordance with the price of labor, supplies, etc., and figures that may have been compiled during the past few years are quite apt to be unreliable at the present time, due to changes in the field of labor and in the cost of various supplies, feeds, milk, etc.

In chapter seven, suggestions are made relative to the proper municipal control of milk supplies and ordinances, rules and regulations, etc. are outlined. Rules of production for certified milk, standards of quality and bacteria counts, methods of making the more common chemical tests for butter fat, protein, preservatives, heating, etc. are outlined together with a few tables of vital statistics in child welfare work being incorporated.

The book on the whole contains a great deal of information that is of interest. It should fill a demand that has heretofore not been met in the various publications that have been issued. The references to the literature on the various phases of the milk industry are very complete and the publishers have done their share in making the volume both attractive and useful. C. W.

NECROLOGY

DR. WILLIAM S. POLLARD

Dr. William S. Pollard, of Baltimore, Maryland, died at St. Agnes' Hospital, in that city, April 8, 1917, of Leukemia. He was born in Cheshire, Connecticut, in July, 1877, and attended the public schools of that place. He came to Washington, D. C., where he secured employment as pressman in the Government Printing Office. He studied veterinary medicine at the United States College of Veterinary Surgeons, from which he was graduated in 1906, and soon after graduation received an appointment as a veterinarian in the Bureau of Animal Industry. He was assigned to duty at the National Stock Yards, East St. Louis, Illinois, and was transferred to Baltimore in April, 1907, where he resided until the date of his death.

MISCELLANEOUS

—The next meeting of the West Virginia Veterinary Medical Association will be held July 5 and 6 at Parkersburg. Dr. J. W. Adams of Philadelphia and Dr. L. A. Merillat of Chicago are expected to be in attendance.

—The Bureau of Animal Industry has established a new station at San Angelo, Texas, with Dr. Irving B. Paxton in charge. This station will be the headquarters of veterinarians engaged in eradication of cattle and sheep scabies in the State of Texas. The following inspectors have been assigned to this force: Drs. Calvin S. Evans, Clyde G. Spencer, Charles Pearson, Louis L. Jones, William E. Dodsworth, Clifton Carter and Irwin E. Barr.

—The vacancy caused by the resignation of Dr. George H. Hart from the Board of Health at Los Angeles, California, has been filled by the appointment of Dr. Maynard Rosenberger, who has resigned from the Bureau of Animal Industry to take up this work.

—A new meat inspection station of the Bureau of Animal Industry has been established at Madison, Wisconsin, with Dr. Simon S. Snyder, formerly of Menominee, Michigan, in charge. Dr. Edward C. Carle succeeds Dr. Snyder as inspector in charge at Menominee.

—Dr. Howard M. Batchelder, for 18 years an inspector in the Bureau of Animal Industry, has resigned to give his attention to personal business and property interests in the vicinity of Sterling, Colorado.

—Dr. R. M. Weightman of Waterville, N. Y. is convalescing from an automobile accident in which he suffered a fractured jaw.

—Dr. H. R. Groome of Jewel City, Kans. has sold his practice to Dr. Harve Frank, a graduate of the Veterinary College at Manhattan, Kans. Dr. Groome and his family have removed to Twin Falls, Idaho. The *Jewel County Republican* states that, in his ten years residence, Dr. Groome, by studious habits, hard work and honorable methods had built up an extra good practice.

—Dr. R. J. Donohue, formerly of North Yakima, Washington, has been appointed Assistant Commissioner of Agriculture, Division of Dairy and Livestock with headquarters at Olympia, Washington.

—Plans are being made in Philadelphia, Pa. to form a branch of the Red Star Animal Relief of the American Humane Association, in connection with the war.

—Dr. E. B. Parker has removed from Bogota to Louisville, Ill.

—Dr. M. J. Williams, of the Bureau of Animal Industry, is located at Magnolia, Ark., for field work in tick eradication.

—The death of Emil von Behring, of the University of Marburg, is announced. As a result of his discovery of the diphtheria antitoxin numberless lives have been saved. Von Behring also turned his attention to the problem of eradicating tuberculosis and emphasized the importance of preventing tuberculous infection in infancy. Subsequently he devised a method of bovovaccination and vaccination with a special tuberculin, but neither of these withstood the test of practical experience.

—According to newspaper dispatches Dr. A. T. Peters of Peoria, Ill, has been appointed State Veterinarian to succeed Dr. O. E. Dyson.

—At a recent meeting of the Rotary Club, Easton, Pa., Dr. C. B. Palmer gave a strong address on the growth and advantages of the veterinary profession.

—Two New Divisions in the Bureau of Animal Industry. Two new divisions have been created in the Bureau of Animal Industry. One is the Tuberculosis Eradication Division with Dr. J. A. Kiernan as chief; the other is the Tick Eradication Division with Dr. R. A. Ramsay as chief. The changes became effective May 1. The Tuberculosis Eradication Division, one of the newly created agencies, will have charge of the work of testing cattle to determine the presence or absence of tubercular infection. This work has been greatly expanded by a recent appropriation by Congress. The second new agency, the Tick Eradication Division, will be devoted exclusively to the work of eradicating the cattle fever tick in the South. The changes will leave the Field Inspection Division, which now handles most of this work, free to devote itself to the enforcement of cattle transportation laws and the combating of miscellaneous animal diseases. This division will have charge, as in the past, of the work of conducting the campaigns waged by the Department of Agriculture against outbreaks of animal maladies, such as foot-and-mouth disease. Dr. Robert A. Ramsay, Chief of the Field Inspection Division, will become Chief of the Tick Eradication Division.

Dr. Arthur W. Miller, also a veterinary inspector of the Field Inspection Division, will become Chief of that division, while Dr. R. W. Hickman will continue as Chief of the Quarantine Division.

JOURNAL

OF THE

American Veterinary Medical Association

Formerly American Veterinary Review

(Original Official Organ U. S. Vet. Med. Ass'n)

PIERRE A. FISH, Editor ITHACA, N. Y.

VOL. LI., N. S. VOL. IV. JULY, 1917. No. 4.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

Enlist for the A. V. M. A. Mobilization at Kansas City, Mo., Aug. 20-24, 1917.

VETERINARY CONSERVATION

One of the important tests of efficiency facing veterinarians, in the mobilization of horses for army purposes, is safeguarding them against so-called "shipping fever". Past experience has shown that when large numbers of horses have been assembled from different sources and shipped to certain centers, outbreaks of this affection occur upon arrival or shortly afterwards. As preventive measures, in the first place, it is obvious that the horses should be sound in health before shipment; in the second place, transportation facilities should be adequate and complete enough to prevent exposure to undue heat or chill, or danger to infection from insanitary cars or pens. Open cattle cars, exposing the animals to mid-day heat and evening chill and inclement weather, have doubtless been a factor in augmenting the number of cases. Cars of this kind properly protected with canvas or closed cars properly ventilated and with a competent veterinarian as inspector during transportation would do much to avoid the difficulty. Such ad-

ditional expense as would be required in insuring these precautions would be a negligible factor as compared with the loss occasioned by the disease. In the third place is the matter of diagnosis. Under the term "shipping fever" or influenza are generally included cases of distemper or strangles and brustseuche or contagious pleuro-pneumonia, the one comparatively mild and the other of a serious nature. With differences in the period of incubation, degree of virulence and of severity, it is wise to separate the two classes of cases and adapt the treatment to conditions. With a large number of horses already purchased by the Allies, the conservation of those left for our own use is of the highest importance.

In the conservation of life, details which seem to be of a minor character are often of major importance. Soldiers wear uniforms of such a color that at a certain distance they seem to blend with the landscape so that they might be unperceived, as targets they are less conspicious. The same precautions should be taken with horses. In France experiments have already been made in dyeing the hair of the horses so that they shall be relatively inconspicuous. It is reported that experiments of a similar nature are under way in this country. Every detail that conserves life deserves most earnest consideration. Never before, in the history of this country, has there been so much need for conservation on the part of the civil and military veterinarians as the period that now confronts us.

If the conservation of animal life is not only desirable but necessary, is it not equally desirable and necessary to conserve human life and resources as affecting the veterinary profession? Our brother veterinarians of Belgium and Northern France have been ruthlessly driven from their homes, separated from their families in many instances, deprived of their possessions and compelled to face a future of hopeless misery unless aid can be furnished by which they may rehabilitate themselves when peace settles down upon these devastated areas. Belgium stood second to none in veterinary education and literature so far as quality is concerned. Her standards have been high and well has she lived up to them. She must be restored to them. Is it not to the interest of the world that the veterinary profession of Belgium should survive? Should not the veterinarians of America consider it an honor and privilege to contribute to this survival? The veterinary profession of unselfish France, bleeding from her war wounds has contributed $4,000. The veterinary profession of

England, staggering under her financial burdens, has contributed something over $600. The veterinary profession of rich America has thus far contributed something under $200. New York, Montana and Massachusetts are the only state associations represented up to the present. By conserving the veterinary profession of this stricken nation we are furthering the conservation of what our profession stands for.

In assuming our share of the burden of the war for humanity we must render all possible service to our allies. In our present situation we can more fully comprehend and appreciate Lincoln's statement: "Let us see to it that a government of the people, for the people, and by the people, shall not perish from the earth". Let us see to it that the remnants of the veterinary profession of Belgium and Northern France shall not disappear. Let us be participants in the great development that is to be. P. A. F.

VETERINARY EFFICIENCY IN THE WAR

Along the line of veterinary activities the striking feature of the war is without a doubt the remarkable report that glanders is practically non-existent in the British artillery, cavalry and transport horses in France. It is a great achievement when it is considered that in the wars of the past glanders was considered the destructive scourge of horses, which on many occasions hampered effective movements of the armies. This feature alone is worthy of the highest commendation of the veterinary profession and speaks well for the thoroughness of the organization.

A convincing proof of the advance and progress of the veterinary profession is the fact that heretofore during the wars infectious diseases of animals were widely scattered among the warring nations, the control of which after the restoration of peace necessitated the most heroic efforts on the part of the authorities. Thus glanders, rinderpest, contagious pleuro-pneumonia, rabies and other scourges followed the wake of the armies. Attention might be directed to the last Balkan war of a few years ago when rinderpest was introduced into Bulgaria and Hungary causing great alarm in these countries.

With this great war, almost three years in progress, there is not the slightest indication that any of the countries are being threatened by the more dangerous forms of infectious diseases.

Aside from the slighter infections such as mange, influenza, strangles, etc., there is no evidence that any of the countries are being endangered by severe outbreaks.

The credit is due to the competence of the veterinary organization which being charged with the inauguration and enforcement of effective measures against such dangers, has admirably fulfilled all expectations.

The veterinary profession in the United States is now on the threshold of its greatest trial in which they will be called upon to give an account of themselves as never before in the history of our country and this is an opportunity which every member of our profession should take advantage of and do his share towards meriting the admiration and respect of our fellow citizens.

A. E.

ARMY VETERINARY SERVICE*

In accordance with the National Defense Act of June 3, 1916, the Army Veterinary Service became a part of the Medical Department of the Army. No adequate provisions were made in the law for a Veterinary Reserve Corps or for an enlisted personnel. Provision is made for a Veterinary Officer's Reserve Corps with rank, pay and allowance of Second Lieutenant but no promotion.

There are fifty-eight men in the Veterinary Corps at present. None in the Veterinary Officer's Reserve Corps and only one hundred and sixty-two candidates for it.

The veterinary service is not organized and is practically without equipment.

The War Department now has approximately 115,000 horses and mules. Under present plans the number will probably be raised to 250,000.

The English army has an efficient veterinary service. Their present organization started at the time of the Boer War. It was carefully and thoroughly planned and has been in operation during the present conflict with most flattering and successful results. From a veterinarian's point of view the English service is ideal. Their old service was much like ours. Under it in the Boer War their losses were 60%. As a result of the present or-

*A report recently presented by the special committee of the A.V.M.A. on Army Veterinary Service to the Medical Section, Council of National Defense and to Surgeon General Gorgas and his staff.

ganization such losses have been reduced to less than 8%. They have found that the minimum number of equines needing veterinary treatment in the present war is 3% of the total number. Figured on this basis if we have 250,000 horses we should be prepared to handle at least 10,000 patients continuously. 625 veterinary officers and approximately 7,000 enlisted men should be provided to care for them. The total number of veterinary officers to be in the proportion of ¼ of 1% of the total number of animals; ¼ of 1% non-commissioned officers and 3% privates.

The English Veterinary Corps has a Director of Veterinary Service who has the rank of Major General. He has a complete organization which is thoroughly equipped with veterinary officers , non-commissioned officers, enlisted men, rations, clothing, shelter for men and animals, medical and surgical supplies with tools and implements for handling 15,000 to 17,000 patients. Animals that are sick, diseased, wounded, worn out or are incapacitated from any cause are turned over from the fighting forces and the remount stations to the veterinary corps which has full charge of them until they are cured, dead, destroyed or sold as unfit for army service. If cured they are returned to the remount service.

Calculating our requirements on the successful experience of the English army we should be equipped with the following:

1. One Veterinary Officer as Director of Veterinary Service located in Washington. One Veterinary Assistant and sufficient help.

2. One Veterinary Officer as Director of Veterinary Service in the field. Five Veterinary Assistants and sufficient help.

3. One Veterinary Officer, two non-commissioned officers and six privates, with each Remount Section of 1,000 horses or less.

4. Two Veterinary Officers for each regiment of Cavalry. Two Non-commissioned Officers as Assistants and two privates.

5. One Veterinary Officer with each Battalion of Artillery. One non-commissioned Officer as Assistant and one private.

6. One Veterinary Officer with each Brigade of Infantry. One non-commissioned Officer as Assistant and one private.

7. One Veterinary Officer with each Divisional Ammunition Train. One non-commissioned Officer as Assistant and one private.

8. One Veterinary Officer with each Divisional Train. One non-commissioned Officer as Assistant and one private.

9. One Veterinary Officer for each Horse Purchasing Board.

10. One Veterinary Officer for each Horse Transport.

MOBILE SECTIONS OR TEMPORARY HOSPITALS.

11. One Mobile Section for each Division of the Army.

12. One Mobile Section for each Cavalry Brigade.

13. Each Mobile Section to be equipped with one Veterinary Officer, three non-commissioned Officers and 17 privates.

BASE HOSPITALS.

14. One Base Hospital for each 25,000 horses and equipped to care for 1,250 patients.

15. Each Base Hospital equipped with five Veterinary Officers, 34 non-commissioned officers, 315 privates, as grooms and dressers, 12 horse shoers, for shoeing patients and training horse shoers, one saddler, two cooks, and 13 horses for the use of the officers in the hospital. This number of privates appears large. It would allow one for every four patients. This is the allowance made in the English army. The French army allows one to six and the Blue Cross one to eight. The English horses show much the best care, and are more fit for service when returned from the hospital.

16. One Veterinary Officer at each Medical Supply Depot in charge of collecting, packing and shipping supplies to the Army Veterinary Service. Sufficient help should be provided.

17. A Veterinary Officers' Reserve Corps should be provided, with the same rank, pay and allowances as now given the regular Veterinary Corps. Appointments and promotions to be made by the President upon the recommendation of the Surgeon-General through the Secretary of War.

18. A Commission of Veterinary Advisers for the Medical Board, Council of National Defense, is recommended.

19. Authority should be given and plans made for the Army Veterinary Service to co-operate with the Federal Bureau of Animal Industry, State Livestock Sanitary Officials and those interested in humane animal relief work.

Dr. A. G. Fisk has resigned his position as Veterinarian for the Colorado Fuel and Iron Company at Trinidad, Colo. to accept a position as assistant manager of the Adams Cattle Co., a large cattle concern at Vermejo Park, New Mexico.

EUROPEAN CHRONICLES

VIRULENCE OF APPARENTLY HEALTHY MUSCLES AND LYMPH GLANDS—What is the degree of virulence of these organs from cattle and swine affected with generalized tuberculosis, is the important question treated by Veterinarian Dr. P. Chausse in the *Annales de L'Institut Pasteur.* As an introduction the writer refers to the history of the question by saying: "It seems as if a number of works have been written and published on the virulence of muscles in generalized tuberculosis. Indeed no value can be attributed to the researches made by ingestion, as observed in experiments, in most part not published, that even Guinea-pigs resist the ingestion of several millions of very virulent and minutely divided bacilli and also a greater quantity of virus, if this consisted of bovine tuberculous material coarsely crushed."

As for the researches made by inoculation, it is not possible to accept those which refer to a very small number of muscular portions, sometimes only one, nor to those in which rabbits were used as subjects, knowing these animals resist inoculation of small doses.

Nor, says Chausse, shall we consider as insufficiently proved the experiments made by intraperitoneal inoculations with Guinea-pigs, because the peritoneum, better adapted to phagocytosis than connective tissue, may absorb some bacillar unities and then fail in revealing an extremely weak virulence.

In this method of research, the intranevous process is less desirable than the peritoneum as it is more favorable to phagocytosis.

Finally the causes of external soiling of the muscle have not always been guarded against with certainty.

The researches made in human species from subjects dead from tuberculosis, which seem to establish that the muscle is frequently virulent, do not permit the conclusion that it is the same with butchered animals. The latter, notwithstanding the disease, are most commonly in apparent good health, and again for human subjects, the blood and the muscles have been inoculated together and it is without doubt the blood which, in the positive cases, contained the pathogenic agents.

After this long history relating to what has been advanced by others, Chausse refers to the virulence of muscles, obtained

from swine and cattle butchered and seized for lesions of extensive tuberculosis with undoubted generalization. A description of the experiments is then given at length.

The virulence of lymph glands, macroscopically sound, forms the third part of Chausse's article. The minute precautions taken to know if these lymph glands, macroscopically sound, from advanced tuberculous animals, were virulent, are described and also the experiments and results obtained are considered.

The entire subject is then passed in review, the various results are discussed by the author and the conclusions arrived at, are here summarized:

1—"In *tuberculous animals, the examination of extra-visceral lymph glands must be made as long as generalization exists.* This examination will permit the recognition of the presence of existing tubercles when there and indicate the measures to be taken.

2—"*The use of the meat of subjects affected with generalized and massive lesions, does not present appreciable danger, even in a raw state.*

3—On the contrary, "*The consumption of lymph glands apparently healthy, is not free from danger, when these glands are not sufficiently cooked.*"

4—*The quite frequent establishment of the occult bacillosis of muscles and lymph glands imposes greater severity towards subjects, carriers of important visceral lesions.*

It must not be forgotten, however, that ingestion is a very difficult mode of infection and requires very large doses of virus and the danger is not to be exaggerated. ,

Otacariasis—It is admitted in classics that the form of the affection known as *psoroptic* was recognized only as existing in the external auditory canal of rabbits and goats, although it has also been observed in the gazelle.

To Professor Henry of Alfort belongs the credit of having demonstrated that not only the above named animals were subject to *psoroptic otacariasis* but also, a very important fact, that it was not exceptional to find cases where the disease was observed in horses, donkeys, mules and sheep.

Although mobilized and engaged in the conflict, Henry has had many opportunities to investigate the subject and he has come to the conclusion that, while to this day, psoroptic mange of

horses has been considered as attacking first, the regions covered with hair, such as the top of the head, the poll, the mane, and the tail, and to spread to the trunk afterwards, the most frequent form was otacariasis, a condition which was demonstrated to him by the close examination and comparison between the number of cases of this variety of mange upon which the observations rested.

The macroscopic lesions are characteristic. Rarely are they unilateral, almost always both ears are affected. The disease is localized in the deepest part of the external auditory canal and to discover it, in the cadaver, the ear must be amputated at its base. Then the bottom of the canal is found packed with a mass of greyish yellow substance, made of wax and epidermic desquamation. More or less developed, it sometimes presents a central canal and when it is removed all in one piece it has the form of an irregular cone with its surface covered with more or less abundant colonies of psoroptes easily observed by the naked eye or as moving little whitish bodies. The skin of the auditory canal is red, moist and more or less desquamated. The psoroptes of the ear seem to have no characters different from those that are found in mangy animals.

The disease is never detected on the outside, yet some peculiar signs indicate its presence. An auricular pruritis is often present, though not always permanent. If animals are in warm stables or exposed to the sun, they may be restless, shaking the head and ears. If they have a chance, they rub themselves carefully at the base of the ear or the parotid region, either against the manger or with their feet, leaving marks over the parts which have been scratched. Gentle scratching with the hand may be supported well and again some animals resent it. The disease prevails in winter as well as in summer. Complications, such as suppurative or median otitis, meningitis, etc., as observed in otacariasis of carnivora or rabbits, were not noticed by Henry.

The diagnosis is difficult by the direct examination of the ear. The local itching or the marks left by the repeated scratching seems to be the only means of diagnosis.

The treatment recommended is simple and easy to apply. The animal is kept quiet with a twitch, an injection is made inside the ear, slowly to allow the liquid to go to the bottom of the auditory canal, with a strong, not irritating antipsoric solution, so as to dissolve the cerumen. Cresyl at 2% or 3% is excellent and

answers all purposes. The operation is to be renewed two or three times, eight days apart, before the ear can be expected to be free from the parasite.

Castration of Cows—Some time ago, before the war, at a meeting of the Societe Centrale, a discussion of the above named subject was held.

Castration of cows is an operation brought forward because of a communication made before the society. During the discussion, some peculiar remarks were made by one of the gentlemen present, who had had the opportunity of witnessing many wonderful performances relating to the operation. It was Mr. Even, who had lived in Buenos Aires for many years and who is known to a few of our friends at their visit in Europe for the lamentable breaking up of the International Veterinary Congress in London. The statements made by Mr. Even to the few who took part in the discussion, were principally on the modus operandi, the duration of the operation and the number of cows that one operator could castrate in one day.

In the Bulletin of the Society Centrale, of January and February, there is published a communication from two French veterinarians, now upon a military mission in Argentina, which brings the subject of the castration of female bovines in that country, as evidence of the correctness of the statements advanced in the discussion that I have mentioned above.

Without allusion to the generalities of the operation, the number of assistants required, the preparation and the instruments used by the operator in Argentina, I merely take notice here of the modus operandi and the duration of the operation, which no doubt are interesting.

For the former, say the authors of the communication: "With the right hand, the operator removes rapidly the vaginal mucus which is always abundant, he then seizes the ovariotomy knife, makes the puncture of the vagina, two fingers in width above the os uteri, then changes his hand, with the thumb and index he enlarges the incision so as to introduce two fingers (the index and the medius) takes hold of the right ovary first and pulls it into the vagina. With his right hand *without any assistance* he takes the ecraseur, passes it over the ovary, the chain, which he makes loose by pushing the handle against his own chest, and

amputates the ovary with all possible rapidity. He grasps the left ovary and removes it in the same manner."

The operation is over. From 4 to 6 seconds are sufficient to amputate both ovaries when once secured.

The duration of the operation is the most interesting part for those who are acquainted with the manipulation of the operation.

"Time between the moment the operator introduces his hand in the vagina and when he draws it out with both ovaries amputated: 1 min., 28 secs.; 3 mins., 10 secs.; 1 min.; 1 min., 40 secs.; 1 min., 30 secs.; 1 min. 27 secs.; 1 min., 34 secs.; 1 min., 32 secs.; 1 min., 28 secs.

"Time of the operation alone, from the perforation of the vagina to the ablation of the ovaries: 52 secs.; 55 secs.; 55 secs.; 58 secs.; 50 secs.; 57 secs.; 52 secs."

Generally speaking, and without hurrying, from 20 to 22 castrations were performed in an hour and as that is done for 8 or 10 hours a day, one is no longer surprised that the authors have witnessed 131 castrations in one day, 186 upon another, 126, 174 and so on.

No doubt the cow castrating trade must be very profitable in Argentina, if properly remunerated.

Ventriclectomy and Vocal Cord Resection—I do not know if the first name is generally accepted, but if it is not it ought to be with the comparatively recent nomenclature admitted in medicine in general and in surgery in particular. At any rate, if it is better known to our readers than to myself, I think the writing of Professor Coquot, who occupies the chair of surgery in Alfort, is deserving of notice, for it calls attention to William's operation in the surgical treatment for roaring in horses "an operation simple, that every one can perform and ought to be tested, it is a fault not to perform it."

The article of Prof. Coquot in the *Recueil,* is not only to praise the operation of Williams, it has another object, viz: to complete it by the ablation of a more or less extensive portion of the vocal cords.

Reviewing concisely the history of the attempts made by Günther in 1845, who, says Coquot, tried successively the resection of the two cords, the ablation of the one on the paralyzed side,

the *ablation of the cord and of the corresponding ventricle* and then the partial or total excision of the arytenoid and finally of the arytenoid to the thyroid. Alluding to the experiments of Möller in Germany and of Fleming in England and quoting the last as having suggested the *excision of the vocal cord* at the same time as that of the arytenoid cartilage. After having given the anatomy of the larynx and its physiology, the professor remarks: "Following the ablation of the ventricular sac, the cicatricial change, by its retraction, draws gradually away the arytenoid from the median line to place it against the corresponding thyroid wing, the ventricle of the glottis disappears and the space of the glottis is enlarged." "But what becomes of the vocal cord during the repairing process?" "Paralyzed, inert and flabby, it has no tendency to follow actively the arytenoid in its outward retracting movement." It may then become a means of interference to the normal entrance of the air in the glottic portion of the laryngeal box.

It is while taking these possibilities into consideration that Coquot has, since 1913, performed the following complementary operation.

After ventriclectomy is performed, the vocal cord is taken hold of with a pair of forceps, in its middle, and with straight fine scissors above and below the forceps an incision is made, thus embracing the *middle portion of the cord* which is then incised below and permits the removal of a square piece of it.

After this excision the ventricle with its membrane removed is readily seen widely open and if it is necessary more or less mucous membrane which may have been left during the first operation, can be taken off.

The result of all this will be, says Coquot, as follows: "The cicatricial retraction will then be assisted, will be more rapid and any folding of the cord will be made impossible. The embryonic tissue, in which will be included the divided edges, will bring them closer together and the repaired vocal cord will be shorter than the original. Its thyroid insertion being fixed, its arytenoid, on the vocal apophysis will hold this in its new and favorable position; the arytenopexia will be more rapid, more complete and more certain, if not more solid."

Immediately after the operation the insertion of a temporary tracheotomy tube, especially made for the purpose, is recom-

mended as a sure means to prevent complications or accidents which may some times occur.

The roughening of the edges of the wounds of the vocal cord has never been essential in the subjects operated by Coquot.

In the presence of the immense number of successful results obtained by the simple process of William's operation, the question will no doubt be asked if the addition proposed here is advantageous, even with its simplicity.

Gastro and Enterotomy in the Dog—In the Veterinary Journal of February last, Canis Major has related a case where these operations were performed. One, the first, very successfully, the other from the condition of the lesions was not completed and the patient allowed to pass away quietly under an anesthetic. The record given by the Major is very interesting and very instructive. As to the etiology of the trouble, some of the symptoms showed peculiar characteristics and the conclusions that one may draw as indications to follow in similar cases are certainly very suggestive. I relate the article briefly.

A Scotch terrier, 3½ years old, had been previously treated for interdigital abscesses. Soon afterward he appeared poorly and emaciated and on that account medical advice was sought. As vomiting seemed to have been a frequent complaint, careful examination was made of the condition of the abdomen. This brought out the diagnosis of the presence of a foreign body. It was then stated by the owner that playing with an imitation rubber bone, the dog had torn it, swallowed several pieces and rejected some. Nevertheless, there was no doubt about the presence of a foreign body in the stomach and surgical interference was urgent.

Without going into the description of the operation, which, of course was performed with all care and precaution necessary, the foreign body, a piece of india rubber, was removed from the opened stomach, after which and after sterilization of the parts and sutures of the wound, the little dog was allowed to get over the period of anesthesia, which had been induced with one grain of morphia hydrochloride half an hour before the operation and followed with chloroform.

The recovery from this was simple and gave rise to no further events. The dog recovered, had a voracious appetite and no variation of temperature. It was a success.

A little over two weeks later, however, conditions changed. A new period of sickness prevailed. Another examination was made of the abdomen and palpation revealed again the presence of a foreign body posterior to the stomach.

A second operation was performed with the same attention and care as before. The foreign body was looked for, located with some difficulty and found in the bowel, which was incised and another piece of rubber bone about the size of a Brazil nut was extracted. The intestine was much thickened, edematous and as the cat gut sutures did not hold, after several attempts, the case was allowed to pass away quietly.

The symptoms presented by the dog were peculiar and worth recalling as Canis Major had the occasion to observe them some time afterwards in another dog, which had a foreign body in the intestines.

"The peculiarity of these symptoms were said to be rather amusing and were observed prior to and following upon the first operation. There was a sudden pulling up after a movement of the bowels, planting the fore feet straight out, extending the body and elevating the head. In this position the dog would remain for about thirty seconds, afterward resuming his walk and later going through the same process again. His appetite was abnormal, even devouring his own feces and while walking would rush at, seize and devour any small object resembling food.

POST-SERIAL TETANUS—In the January number, 1917, of the *Annales de L'Institut Pasteur,* this question was the object of a long communication from Doctor August Lumiere. Although the fifty-four observations, which he related and summarized as the reasons for the article, are also referable to the disease in man, I have thought that without entering into the consideration of the early or latent tetanus or the symptomatology, prognosis and treatment of the post-serial disease, the general conclusions of Dr. Lumiere might prove of some interest and perhaps not without instruction.

1. Preventive injections of antitetanic serum do not possess an absolute and unlimited prophylactic action.

2. The duration of the absolute immunity conferred by the serum cannot be positively given; it depends upon the relative

proportion of toxin and preventive serum present in the organism.

3. Cases of post-serial tetanus appear to be due to the two following causes: (a) superabundance of secretion of toxins around the wound, proportionally below the dose of preventive serum injected, (early post-serial tetanus); (b) liberation of the tetanic spores, until then in a state of latent life, in the tissues, by a secondary surgical interference or a traumatism, when the activity of the antitoxin is exhausted, (late post-serial tetanus).

4. Early post-serial tetanus may in most cases be avoided by free incision of infected wounds, careful removal of all foreign bodies or substances they may contain, by free drainage and repeated injections of serum.

5. Late post-serial tetanus is also avoided in more than half of the cases, by injections of a new dose of serum, at the time of any secondary surgical action.

6. Preventive serum sometimes gives to post-serial tetanus peculiar characters, by altering more or less the symptomatology of the disease and its clinical evolution.

7—In a certain number of cases of post-serial tetanus injected antitoxin has prevented the fixation of the microbian poison upon the central nervous system, limiting its action to the motor nerves of the wounded limb. This localized tetanus without trismus is less severe than the others.

8. In a few other cases, the bulbo-medullary centers are only partially protected, then the appearance of a late or incomplete trismus, accompanying the local contracture, is observed.

9. When the antitoxin has not protected the central nervous centers, there is observed the post-serial form with trismus from the start. This is more frequent and requires a more severe prognosis.

10. The treatment of post-serial tetanus seems to demand the administration, as early as possible, of large doses of serum.

There is to this day no curative treatment, symptomatic manifestations are to be attended.

Against permanent contractions, one is disarmed, but paroxysmal spasms can be relieved by chloral, morphine, injections of sulfate of magnesia or of persulfate of soda. The latter seems to be the chosen drug on account of its efficacy and its weak toxicity.

SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

BUREAU OF ANIMAL INDUSTRY—*Bulletin 517*—(Professional.) An Intradermal Test for Bacterium Pullorum Infection in Fowls. *Bulletin 781* (Farmer). Tuberculosis of Hogs. *Bulletin 777.* Feeding and Management of Dairy Calves and Young Stock. *Bulletin 790*—Contagious Abortion of Cattle. *Bulletin 784*—Anthrax or Charbon. *Bulletin 779*—How to Select a Sound Horse.

IL NUOVO ERCOLANI.—March. Report of the First Year of Military Laboratory of the Polyvalent Antipyogenic Serum of Lanfranchi. Some Special Indications of Surgical Interference. March. (O) Some Peculiar Surgical Interferences.

BULLETIN DE LA SOCIETE CENTRALE.—Jan. and Feb. (X) Otacariasis and Prophylaxis of Psoroptic Mange. (X) Castration of Cows in Argentina. Treatment of Mange. (O) Sudden Death by Thrombus of Left Ventricle. (O) Intra-tracheal Injections.

REVUE GENERALE DE MEDECINE VETERINAIRE.—(X) Polyvalent Serum in Veterinary Practice Therapeutic. (X) Treatment of Wounds.

VETERINARY JOURNAL.—March—(X) Tips on the Camel. Impetigo. Fluke in Sheep. Tetanus Bacilli and Microbian Associates. (O) Uterine Septicemia. (O) Eversion of the Uterus with Milk Fever. (O) Schrapnel Injury. (O) Eversion of the Uterus in a Mare.

VETERINARY NEWS.—(O) Clinical Notes. Gastric and Intestinal Tympany and Esophageal Trouble. (O) Anthrax in a Cow. (O) Rupture of the Perforans Tendon. March 17th.—Mammitis in Cows. (O) An Interesting Case. (O) An interesting Case of Fibromata. Remarks on Feline Practice.

VETERINARY RECORD.—March.—Purpura. (O) Unusual Cases. Black Quarter? in Pigs. (O) Induction of Premature Labor in Mares and Cows. Vesicular Stomatitis Contagiosa. March 24.—Interesting Case of Fibromata. March 31.—Suppurate Infection of the Coronet and Pastern. (X) History of Mallein in England.

A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

—Dr. W. H. Ridge of Pennsylvania spoke on Dr. Williams' method of treating sterility in cattle at a meeting of the Portland Farmers' Club at Portland, Maine, April 11. An invitation was extended to the Maine Veterinary Medical Association, in its annual session, to attend the evening meeting.

—Dr. John T. Dallas of the Bureau of Animal Industry has been transferred from Provo, Utah to New Albany, Miss.

THE VIRULENCE OF HOG-CHOLERA BLOOD AT DIFFERENT PERIODS DURING THE DISEASE

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The object of this study was to ascertain if possible the virulence of hog-cholera blood at different periods during the course of the acute type of the disease. Also to ascertain the average time in which hog-cholera blood reaches its maximum virulence following inoculation. In the production of hog-cholera blood for serum purposes any method by which the opportune time for killing virus hogs could be shortened would mean great economy in time, cost and probably an increase in the potency of the final anti-serum.

During 1914, 1915 and 1916, eleven groups of from four to fourteen susceptible hogs of about a hundred pounds in weight were inoculated with 2 or 2.5 cubic centimeters of hog-cholera blood, known as stock virus of eight day strain.

It has been our practice at this station for the past three years to maintain the virulence of our virus blood by frequent passage through the bodies of suckling pigs, from three to five weeks of age, from susceptible dams. Some of the blood obtained from these pigs is used for the inoculation of another series of pigs while the balance of this blood is used for the production of virus. When the suckling pigs are killed seven, eight or nine days after inoculation, the blood is known as seven, eight or nine day stock blood. Phenol is added to this blood (½%) two days previous to the inoculation of susceptible hogs which are intended for virus production.

The body temperatures of the virus hogs were taken daily with a few omissions until the last bleeding, after which admittance into the virus house was avoided for fear of carrying the infection to the experimental pens. All virus hogs which failed to react to the inoculations were discarded from the experiments. Four, five, six, seven and eight days after inoculation, as hereinafter described, these virus hogs were bled aseptically from the tails into sterilized test tubes. An equal amount of blood from each hog of the same bleeding was mixed together. This mixed blood was then used to inoculate susceptible pigs from non-vaccinated dams.

These pigs varied in weight from forty to fifty pounds. The blood was administered intramuscularly in one-half and one cubic centimeter doses. One or more pigs of a litter were used for each of the inoculations, and as controls against hog-cholera by pen exposure. All of the pigs except a few were allowed to die. They were placed in thoroughly disinfected pens having concrete floors. Feed was kept free from any probable hog cholera contamination. The body temperatures were taken nearly every day except Sunday. Owing to their extensiveness the body temperatures are omitted from the tables. The usual precautions were observed in protecting the pigs against exposure to hog-cholera from outside sources such as feed, clothing and implements. We were quite successful in this respect, as will be noted only one lot of pigs was involved with probable outside infection. On the other hand quite a few pigs having partial immunity were encountered. In neither case are the involved pigs included in the final summary.

EXPERIMENT I. Ten virus hogs were bled from the tail five days following inoculation. Five were killed seven days following inoculation, when samples of blood were collected in sterile test tubes. Only the blood of these five was used in the experiment. The five and seven day samples were mixed separately, that is the five-day bleeds were kept separate from the seven-day bleeds, and each mixture injected into six pigs. Four pigs of the same litters were used as controls against pen exposure. It is quite probable that hog 779 was infected previous to inoculation, although no symptoms were exhibited before the third day following inoculation.

The results of the experiment show that the seven-day final blood is slightly more virulent than the five-day tail blood, and that more variation occurred in the duration of the disease following the injection of one-half cubic centimeter than with the one cubic centimeter of blood. Table I shows the kind of virus injected and the duration of the disease.

EXPERIMENT II. Eight virus hogs were bled from the tails five days after inoculation. Four were again bled from the tails seven days after inoculation. Only the blood of these four was used in the experiment. The five and seven-day bleedings were mixed separately and injected into pigs as in Experiment I. Of these pigs Nos. 248 and 262 were evidently partially immune and are not included in the final summary, neither is pig 249 included

TABLE NO. I.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
779	100	10–28–14	2	8-day stock virus	Killed in 7 days, well marked
781	100	10–28–14	2	8-day stock virus	Killed in 7 days, well marked
782	100	10–28–14	2	8-day stock virus	Killed in 7 days, well marked
785	100	10–28–14	2	8-day stock virus	Killed in 7 days, well marked
786	100	10–28–14	2	8-day stock virus	Killed in 7 days, well marked
348	40	11– 3–14	½	5th day tail-bled from above hogs	Killed in 11 days, well marked
349	45	11– 3–14	½	5th day tail-bled from above hogs	Killed in 10 days, well marked
350	40	11– 3–14	½	5th day tail-bled from above hogs	Killed in 16 days, fairly well marked
345	40	11– 3–14	1	5th day tail-bled from above hogs	Killed in 12 days, well marked
346	40	11– 3–14	1	5th day tail-bled from above hogs	Killed in 13 days, well marked
347	40	11– 3–14	1	5th day tail-bled from above hogs	Killed in 13 days, well marked
992	45	11– 4–14	—	Control—pen exposed	Killed in 22 days, well marked
993	40	11– 4–14	—	Control—pen exposed	Killed in 29 days, fair to poor
112	40	11– 4–14	½	7th day final bled from above hogs	Killed in 13 days, well marked
114	40	11– 4–14	½	7th day final bled from above hogs	Killed in 14 days, well marked
104	40	11– 4–14	½	7th day final bled from above hogs	Killed in 10 days, well marked
103	40	11– 4–14	1	7th day final bled from above hogs	Killed in 14 days, well marked
109	40	11– 4–14	1	7th day final bled from above hogs	Killed in 13 days, well marked
106	40	11– 4–14	1	7th day final bled from above hogs	Killed in 12 days, well marked
111	40	11– 4–14	—	Control—pen exposed	Killed in 19 days, fair to poor
107	40	11– 4–14	—	Control—pen exposed	Killed in 19 days, fair to good

TABLE NO. II.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
151	100	1–12–15	2	8-day stock virus	Killed in 8 days, well marked
152	100	1–12–15	2	8-day stock virus	Killed in 8 days, well marked
155	100	1–12–15	2	8-day stock virus	Killed in 8 days, well marked
159	100	1–12–15	2	8-day stock virus	Killed in 8 days, well marked
263	40	1–19–15	½	5th day tail bled from above hogs	Killed in 31 days, fair to poor
265	40	1–19–15	½	5th day tail bled from above hogs	Killed in 20 days, well marked
264	40	1–19–15	1	5th day tail bled from above hogs	Killed in 20 days, well marked
266	40	1–19–15	1	5th day tail bled from above hogs	Killed in 15 days, well marked
261	40	1–19–15	—	Control—pen exposed	Killed in 17 days, well marked
*262	40	1–19–15	—	Control—pen exposed	Killed in 42 days, well marked
251	40	1–19–15	½	7th day tail bled from above hogs	Killed in 13 days, poor to fair
252	40	1–19–15	½	7th day tail bled from above hogs	Killed in 13 days, fair to good
*249	40	1–19–15	1	7th day tail bled from above hogs	Killed in 9 days, slight enteritis
253	40	1–19–15	1	7th day tail bled from above hogs	Killed in 13 days, well marked
250	40	1–19–15	—	Control—pen exposed	Killed in 20 days, well marked
*248	40	1–19–15	—	Control—pen exposed	Killed in 49 days, poor

*Excluded from summary.

TABLE NO. III.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
1	100	1–12–15	2	8-day stock virus	Killed in 10 days, well marked
2	100	1–12–15	2	8-day stock virus	Killed in 9 days, well marked
4	100	1–12–15	2	8-day stock virus	Killed in 10 days, well marked
6	100	1–12–15	2	8-day stock virus	Killed in 10 days, well marked
7	100	1–12–15	2	8-day stock virus	Killed in 10 days, well marked
8	100	1–12–15	2	8-day stock virus	Killed in 9 days, well marked
160	100	1–12–15	2	8-day stock virus	Killed in 9 days, well marked
258	40	1–19–15	½	6th day tail bled from above hogs	Killed in 15 days, well marked
259	40	1–19–15	½	6th day tail bled from above hogs	Killed in 17 days, well marked
254	40	1–19–15	1	6th day tail bled from above hogs	Killed in 11 days, fair to good
260	40	1–19–15	1	6th day tail bled from above hogs	Killed in 16 days, fairly well marked
255	40	1–19–15	—	Control—pen exposed	Killed in 17 days, well marked
257	40	1–19–15	—	Control—pen exposed	Killed in 20 days, well marked
281	40	1–20–15	½	8th day tail bled from above hogs	Killed in 12 days, well marked
284	40	1–20–15	½	8th day tail bled from above hogs	Killed in 12 days, well marked
280	40	1–20–15	1	8th day tail bled from above hogs	Killed in 10 days, well marked
283	40	1–20–15	1	8th day tail bled from above hogs	Killed in 13 days, fairly well marked
286	40	1–20–15	—	Control—pen exposed	Killed in 23 days, well marked
282	40	1–20–15	—	Control—pen exposed	Killed in 16 days, well marked

Table No. IV.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
86	100	2-24-15	2	8-day stock virus	Killed in 8 days, well marked
87	100	2-24-15	2	8-day stock virus	Killed in 8 days, well marked
88	100	2-24-15	2	8-day stock virus	Killed in 9 days, well marked
91	100	2-24-15	2	8-day stock virus	Killed in 11 days, well marked
92	100	2-24-15	2	8-day stock virus	Killed in 9 days, well marked
98	100	2-24-15	2	8-day stock virus	Killed in 8 days, well marked
99	100	2-24-15	2	8-day stock virus	Killed in 8 days, well marked
100	100	2-24-15	2	8-day stock virus	Killed in 8 days, well marked
355	100	2-24-15	2	8-day stock virus	Killed in 8 days, well marked
*381	40	3- 4-15	½	5th day tail bled from above hogs	Lived, vaccinated 40th day
383	40	3- 4-15	2	5th day tail bled from above hogs	Killed in 27 days, fair to good
380	40	3- 4-15	1	5th day tail bled from above hogs	Killed in 25 days, fair to good
*379	40	3- 4-15	1	5th day tail bled from above hogs	Lived vaccinated 40th day
*382	40	3- 4-15	—	Control—pen exposed	Killed in 41 days, poor
384	40	3- 4-15	—	Control—pen exposed	Killed in 23 days, fair to poor
386	40	3- 4-15	½	7th day tail bled from above hogs	Killed in 15 days, well marked
390	40	3- 4-15	½	7th day tail bled from above hogs	Killed in 16 days, well marked
388	40	3- 4-15	1	7th day tail bled from above hogs	Killed in 12 days, well marked
391	40	3- 4-15	1	7th day tail bled from above hogs	Killed in 15 days, well marked
385	40	3- 4-15	—	Control—pen exposed	Killed in 27 days, well marked
392	40	3- 4-15	—	Control—pen exposed	Killed in 26 days, well marked

*Excluded from summary.

in the final summary as death was hastened by indigestion. Autopsy revealed extreme enteritis.

The results of this experiment show a stronger reaction with one cubic centimeter than with one-half cubic centimeter of blood, and that the seven-day blood was more virulent than the five-day blood. Table II shows the kind of virus injected and the duration of the disease.

Experiment III. Eight hogs were inoculated with virus. Seven were bled from the tails six and eight days following inoculation. The six and eight-day bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments.

The results of this experiment show a slightly stronger reaction with one cubic centimeter than with one-half cubic centimeter of blood, and that the eight-day blood is more virulent that the six-day tail blood. Table III shows the kind of virus injected and the duration of the disease.

Experiment IV. Nine virus hogs were bled from the tails five and seven days following inoculation. These bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments. Two of these pigs 379 and 381 recovered from the injections, while pig 382 died forty-one days after injection. These three pigs are not included in the final summary. Litter mates of these pigs received the seven-day blood and died in from twelve to sixteen days following injection.

The results of this experiment show a marked difference in virulence between the five and seven-day tail bleedings, and a slightly greater degree of virulence with one cubic centimeter than with one-half cubic centimeter of blood. Table IV shows the kind of virus injected and the duration of the disease.

Experiment V. Five virus hogs were tail bled five and seven days following inoculation. These bleedings were mixed and injected into susceptible pigs as in the preceding experiments.

The results of this experiment show that the seven-day bleedings were more virulent than the five-day bleedings, and that one-half cubic centimeter of blood was more virulent in both the five and seven-day bleedings than one cubic centimeter. Table V shows the kind of virus injected and the duration of the disease.

Experiment VI. Nine out of fourteen virus hogs were bled from the tails four and eight days following inoculation. The bleedings were mixed separately and injected into susceptible pigs

TABLE No. V.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
564	100	4–17–15	2	8-day stock virus	Killed in 8 days, well marked
566	100	4–17–15	2	8-day stock virus	Killed in 9 days, well marked
570	100	4–17–15	2	8-day stock virus	Killed in 8 days, well marked
572	100	4–17–15	2	8-day stock virus	Killed in 8 days, well marked
574	100	4–17–15	2	8-day stock virus	Killed in 8 days, well marked
528	40	4–24–15	½	5th day tail bled from above hogs	Killed in 20 days, well marked
532	40	4–24–15	½	5th day tail bled from above hogs	Killed in 10 days, well marked
531	40	4–24–15	½	5th day tail bled from above hogs	Killed in 17 days, well marked
533	40	4–24–15	½	5th day tail bled from above hogs	Killed in 18 days, well marked
529	40	4–24–15	—	Control—pen exposed	Killed in 20 days, well marked
530	40	4–24–15	½	Control—pen exposed	Killed in 18 days, well marked
521	40	4–24–15	½	7th day tail bled from above hogs	Killed in 11 days, well marked
523	40	4–24–15	½	7th day tail bled from above hogs	Killed in 13 days, well marked
525	40	4–24–15	½	7th day tail bled from above hogs	Killed in 13 days, well marked
526	40	4–24–15	½	7th day tail bled from above hogs	Killed in 16 days, well marked
524	40	4–24–15	—	Control—pen exposed	Killed in 17 days, well marked
527	40	4–24–15	—	Control—pen exposed	Killed in 17 days, well marked

TABLE NO. VI.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
298	100	10–13–15	2	8-day stock virus	Killed in 9 days, extreme
300	100	10–13–15	2	8-day stock virus	Killed in 9 days, extreme
301	100	10–13–15	2	8-day stock virus	Killed in 10 days, extreme
302	100	10–13–15	2	8-day stock virus	Killed in 11 days, extreme
304	100	10–13–15	2	8-day stock virus	Killed in 9 days, well marked
305	100	10–13–15	2	8-day stock virus	Killed in 9 days, well marked
307	100	10–13–15	2	8-day stock virus	Killed in 19 days, extreme
309	100	10–13–15	2	8-day stock virus	Killed in 9 days, extreme
310	100	10–13–15	2	8-day stock virus	Killed in 9 days, extreme
178	40–50	10–21–15	½	4th day tail bled from above hogs	Killed in 11 days well marked
181	40–50	10–21–15	½	4th day tail bled from above hogs	Killed in 14 days, well marked
184	40–50	10–21–15	½	4th day tail bled from above hogs	Killed in 20 days, well marked
182	40–40	10–21–15	—	Control—pen exposed	Killed in 23 days, well marked
*179	40–50	10–21–15	½	8th day tail bled from above hogs	Killed in 11 days well marked
*185	40–50	10–21–15	½	8th day tail bled from above hogs	Killed in 15 days, well marked
*301	40–50	10–21–15	½	8th day tail bled from above hogs	Killed in 11 days well marked
*180	40–50	10–21–15	—	Control—pen exposed	Killed in 14 days, well marked

*Excluded from summary.

TABLE NO. VII.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
391	100	11–15–15	3	8-day stock virus	Killed in 7 days, well marked
394	100	11–15–15	3	8-day stock virus	Killed in 7 days, well marked
395	100	11–15–15	3	8-day stock virus	Killed in 7 days, well marked
397	100	11–15–15	3	8-day stock virus	Killed in 7 days, well marked
399	100	11–15–15	3	8-day stock virus	Killed in 7 days, well marked
400	100	11–15–15	3	8-day stock virus	Killed in 7 days, well marked
279	40–50	11–24–15	½	4th day tail bled from above hogs	Killed in 17 days, well marked
280	40–50	11–24–15	½	4th day tail bled from above hogs	Killed in 17 days, well marked
281	40–50	11–24–15	½	4th day tail bled from above hogs	Killed in 16 days, well marked
278	40–50	11–24–15	—	Control—pen exposed	Killed in 23 days, well marked
275	40–50	11–24–15	½	7th day final bled from above hogs	Killed in 9 days, well marked
276	40–50	11–24–15	½	7th day final bled from above hogs	Killed in 10 days, well marked
277	40–50	11–24–15	½	7th day final bled from above hogs	Killed in 9 days, well marked
274	40–50	11–24–16	—	Control—pen exposed	Killed in 15 days, well marked

as in the preceding experiments. In this and all succeeding experiments only one-half cubic centimeter of blood was used for inoculating the experimental pigs. As the control with the pigs, which received the eight-day virus, became infected apparently from an outside source, these four pigs are not included in the final summary.

The results of this experiment show that the four-day blood produced death on an average of fifteen days. If one could accept the temperatures of the pigs inoculated with the eight-day blood as due to the inoculation and not due to pen exposure, this blood might be considered more virulent than the four-day blood as it produced death on an average of less than thirteen days. Table VI shows the kind of virus injected and the duration of the disease.

Experiment VII. Ten hogs were inoculated with virus. Of these six were bled from the tails and killed in seven days following inoculation. Equal amounts of the tail bleedings and the final bleedings were mixed separately and injected into susceptible pigs as in the previous experiment.

The result of this experiment shows that the seven-day final blood was considerably more virulent than the four-day tail blood. Table VII shows the kind of virus injected and the duration of the disease.

Experiment VIII. Ten virus hogs were bled from the tails four days after inoculation. Eight days after inoculation four were killed and six were tail bled. The blood of the four was mixed with the six eight-day tail bleedings. Both the four and eight-day bleedings were then injected separately into susceptible pigs as in the preceding experiments. Of these pigs 470 and 477 were immune and are not included in the final summary.

The result of this experiment shows that the eight-day mixed tail and final blood was more virulent than the four-day tail blood. Table VIII shows the kind of virus injected and the duration of the disease.

Experiment IX. Seven out of ten virus hogs were bled from the tails four days and killed eight days following inoculation. The bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments.

The result of this experiment shows that the eight-day final blood was more virulent than the four-day tail blood. But not any more so than in the preceding experiment where the eight-day

Table No. VIII.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
209	100	2-14-16	2½	8-day stock virus	Lived, vaccinated
211	100	2-14-16	2½	8-day stock virus	Killed in 8 days, well marked
213	100	2-14-16	2½	8-day stock virus	Killed in 8 days, well marked
215	100	2-14-16	2½	8-day stock virus	Killed in 8 days, well marked
216	100	2-14-16	2½	8-day stock virus	Killed in 11 days, well marked
217	100	2-14-16	2½	8-day stock virus	Killed in 9 days, well marked
219	100	2-14-16	2½	8-day stock virus	Killed in 8 days, well marked
221	100	2-14-16	2½	8-day stock virus	Killed in 11 days, slight
222	100	2-14-16	2½	8-day stock virus	Killed in 9 days, well marked
223	100	2-14-16	2½	8-day stock virus	Killed in 16 days, well marked
474	40-50	2-23-15	½	4th day tail bled from above hogs	Killed in 15 days, well marked
476	40-50	2-23-15	½	4th day tail bled from above hogs	Killed in 15 days, well marked
*477	40-50	2-23-15	½	4th day tail bled from above hogs	Lived, vaccinated
475	40-50	2-23-15	—	Control—pen exposed	Killed in 26 days, well marked
*470	40-50	2-23-15	½	8th day tail and final bled from above hogs	Lived, vaccinated
471	40-50	2-23-15	½	8th day tail and final bled from above hogs	Killed in 12 days, well marked
472	40-50	2-23-15	½	8th day tail and final bled from above hogs	Killed in 12 days, well marked
473	40-50	2-23-15	—	Control—pen exposed	Killed in 22 days, well marked

*Excluded from summary.

TABLE NO. IX.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
374	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
375	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
376	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
378	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
379	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
382	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
383	100	3- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
515	40–50	3-16-16	½	4th day tail bled from above hogs	Killed in 16 days, well marked
516	40–50	3-16-16	½	4th day tail bled from above hogs	Killed in 13 days, well marked
517	40–50	3-16-16	½	4th day tail bled from above hogs	Killed in 19 days, well marked
518	40–50	3-16-16	—	Control—pen exposed	Killed in 18 days, well marked
512	40–50	3-16-16	½	8th day final bled from above hogs	Killed in 14 days, well marked
513	40–50	3-16-16	½	8th day final bled from above hogs	Killed in 13 days, well marked
514	40–50	3-16-16	½	8th day final bled from above hogs	Killed in 14 days, well marked
511	40–50	3-16-16	—	Control—pen exposed	Killed in 18 days, well marked

TABLE No. X.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
558	100	3-31-16	2½	8-day stock virus	Lived, vaccinated
559	100	3-31-16	2½	8-day stock virus	Killed in 10 days, well marked
560	100	3-31-16	2½	8-day stock virus	Killed in 12 days, well marked
561	100	3-31-16	2½	8-day stock virus	Lived, vaccinated
563	100	3-31-16	2½	8-day stock virus	Lived, vaccinated
564	100	3-31-16	2½	8-day stock virus	Killed in 13 days, slight
565	100	3-31-16	2½	8-day stock virus	Killed in 10 days, slight
566	100	3-31-16	2½	8-day stock virus	Killed in 10 days, well marked
567	100	3-31-16	2½	8-day stock virus	Lived, vaccinated
568	100	3-31-16	2½	8-day stock virus	Killed in 10 days, well marked
615	40-50	4-11-16	½	5th day tail bled from above hogs	Killed in 25 days, well marked
616	40-50	4-11-16	½	5th day tail bled from above hogs	Killed in 17 days, well marked
617	40-50	4-11-16	½	5th day tail bled from above hogs	Killed in 18 days, well marked
618	40-50	4-11-16	—	Control—pen exposed	Killed in 22 days, well marked
619	40-50	4-11-16	½	7th day tail bled from above hogs	Killed in 17 days, well marked
*620	40-50	4-11-16	½	7th day tail bled from above hogs	Killed in 30 days, slight—chronic
621	40-50	4-11-16	½	7th day tail bled from above hogs	Killed in 17 days, slight—acute
622	40-50	4-11-16	—	Control—pen exposed	Killed in 16 days, well marked

*Excluded from summary.

blood was made up of mixed final and tail bleedings. Table IX shows the kind of virus injected and the duration of the disease.

EXPERIMENT X. Ten virus hogs were bled from the tails five and seven days following inoculation. The bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments. Pig 620 was apparently partially immune and is not included in the final summary.

The result of this experiment shows a greater degree of virulence in the seven-day than in the five-day tail blood. Table X shows the kind of virus injected and the duration of the disease.

EXPERIMENT XI. Ten virus hogs were bled from the tails five and seven days following inoculation. The bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments. Pig 664 was apparently partially immune and is not included in the final summary.

The result of this experiment shows a slightly greater degree of virulence with the seven-day than with the five-day tail blood. Table XI shows the kind of virus injected and the duration of the disease.

SUMMARY. In the preceding experiments over one hundred pigs were used. The results of these experiments show a gradual increase in virulence of tail-bled blood from four to eight days following inoculation. This increase in virulence is also shown in the averages of the control pigs, except those exposed to the eight-day blood pigs. In these there is an apparent slight increase in the average number of days lived.

A peculiarity noted in several of the experiments was the fact that the disease when definitely established was of shorter duration in the control pigs than in the inoculated pigs. That is a control pig would contract cholera from an inoculated pig and die before the inoculated pig.

In regard to the amount of blood inoculated, one cubic centimeter was more virulent than one-half cubic centimeter. The average number of days lived was one day less with one cubic centimeter than with one-half cubic centimeter of blood.

Blood obtained on slaughter seven and eight days following inoculation proved to be more virulent than any of the tail bleedings. The average number of days lived being one day less than that shown by the seven and eight-day tail bleedings. Thus indicating that final (stuck) is slightly more virulent than tail blood.

TABLE NO. XI.

Pig No.	Weight lbs.	Date	Dose c.c.	Virulent Blood	Duration and Lesions of Hog-Cholera
650	100	4- 6-16	2½	8-day stock virus	Lived, vaccinated
652	100	4- 6-16	2½	8-day stock virus	Lived, vaccinated
653	100	4- 6-16	2½	8-day stock virus	Killed in 11 days, well marked
654	100	4- 6-16	2½	8-day stock virus	Killed in 8 days, slight
655	100	4- 6-16	2½	8-day stock virus	Killed in 9 days, well marked
656	100	4- 6-16	2½	8-day stock virus	Killed in 8 days, slight
657	100	4- 6-16	2½	8-day stock virus	Killed in 8 days, slight
658	100	4- 6-16	2½	8-day stock virus	Killed in 8 days, well marked
659	100	4- 6-16	2½	8-day stock virus	Lived, vaccinated
658-a	40-50	4-15-16	½	5th day tail bled from above hogs	Killed in 18 days, well marked
659-a	40-50	4-15-16	½	5th day tail bled from above hogs	Killed in 12 days, well marked
661	40-50	4-15-16	½	5th day tail bled from above hogs	Killed in 21 days, wel marked
660	40-50	4-15-16	—	Control—pen exposed	Killed in 18 days, well marked
662	40-50	4-15-16	½	7th day tail bled from above hogs	Killed in 11 days, well marked
*664	40-50	4-15-16	½	7th day tail bled from above hogs	Killed in 26 days, chronic—slight
665	40-50	4-15-16	½	7th day tail bled from above hogs	Killed in 18 days, well marked
663	40-50	4-15-16	—	Control—pen exposed	Killed in 13 days, well marked

*Excluded from summary.

When virus hogs are killed beginning six days after inoculation without noting the presence or absence of fever and symptoms, a condition will be met with similar to that shown in table X, where several of the virus hogs recovered from the inoculation. Such virus will be very apt to produce an anti-serum of low potency.

It was noticed during the experiments that quite a few of the tail-bled virus hogs recovered. These recoveries were more numerous than those occurring in other hogs from the same lot similarly inoculated but not tail-bled. However, no record was kept of this feature.

Table XII shows the number of pigs inoculated and exposed with the different kinds of blood obtained, and the average number of days which they lived.

TABLE No. XII.

Number of Pigs	Kind of Virus	Average No. days lived
13	Four-day tail blood	17.30
5	Controls (Pen exposure)	22.60
20	Five-day tail blood	16.85
7	Controls (pen exposure)	20.85
4	Six-day tail blood	14.75
2	Controls (pen exposure)	18.50
25	Seven-day mixed blood	13.04
11	Controls (pen exposure)	17.18
9	Eight-day mixed blood	12.44
4	Controls (pen exposure)	19.75
50	Received ½ c.c. of blood	15.18
21	Received 1 c.c. of blood	14.28
29	Controls (pen exposure)	19.68

CONCLUSIONS. From this study of hog cholera blood it has been conclusively shown that there is a gradual increase in the virulence of the blood as the disease progresses from four to eight days following inoculation, and that the eight-day blood was the most virulent.

In producing virus for serum production, one may be justified in killing such hogs, beginning six days following inoculation, providing there is a corresponding high temperature and a manifestation of symptoms, especially weakness.

NOTES IN REGARD TO HORSE LICE, *TRICHODECTES* AND *HAEMATOPINUS*

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Horses are infested with two kinds of lice, the sucking louse, *Haematopinus asini* (*Haematopinus macrocephalus*), and the biting lice, *Trichodectes pilosus* and *Trichodectes parumpilosus*. The two forms are readily distinguishable, as the sucking louse is a larger louse with a long pointed head and the biting lice are smaller forms with a blunt rounded head. (See figures.) The sucking louse, as the term suggests, is a blood-sucker. The biting louse lives on the superficial epidermal scales and the debris and secretions present on the skin. The sucking louse is probably the more vicious pest of the two, as the loss of blood from the attacks of large numbers of these lice may be a serious matter. There is probably little difference in the degree or amount of annoyance due to the presence and irritation from the two different kinds of lice, but even here the puncturing of the skin by *Haematopinus* is perhaps more irritating than the biting of the superficial epidermis by *Trichodectes*. Both forms give rise to itching, and the results from this are often surprisingly unpleasant. A barn full of horses may become a pandemonium as a result of lice. The itching animals attempt to relieve the itching by rubbing and biting, other animals start to kick, presently the kicking becomes general and there is a resultant clamor and din, with a substantial element of danger to the horses and attendants. Occasionally the lice will give rise to eczema. Lice seem to be more numerous in late winter or early spring. They are more readily detected when horses stand in the warm sunshine, as this brings the lice to the surface. The sucking lice are especially easy to detect on white horses.

Attempts to find exact published information in regard to the bionomics of the horse lice indicate that not very much work has been done along these lines. The large literature on the bionomics of the louse parasitic on man, *Pediculus humanus*, a very large part of which has come into existence since the beginning of the present war, suggests that this lack of information regarding horse lice is not merely apparent, but real. Many persons, writing on

horse lice, discuss periods of treatment, remedies, and other matters for biting lice and sucking lice together, apparently on the basis that a louse is a louse and, more especially, that a horse louse is a horse louse. But inasmuch as there is a rather wide gap between a sucking louse and a biting louse, the first belonging to the Hemiptera and the second to the Mallophaga, it might be as safely assumed that there would be considerable difference between the two kinds as regards not only structure, but also bionomics and, consequently, details of treatment. A few very tentative experiments seem to confirm this idea.

HORSE LICE

SUCKING LOUSE

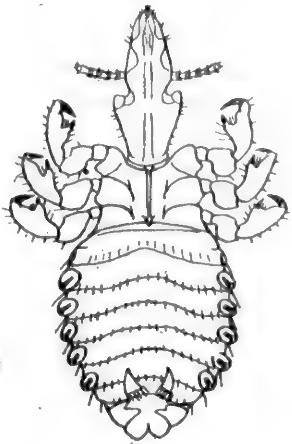

FIG. 1. *Haematopinus asini* (*H. macrocephalus*) Female. x16. After Neveu-Lemaire (1912)

BITING LICE

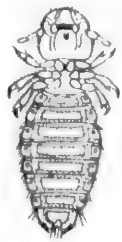

FIG. 2. *Trichodectes parumpilosus.* Female x14. After Neveu-Lemaire (1912)

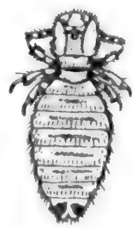

FIG. 3. *Trichodectes pilosus* (*Tr. vestitus*). Female. x14. After Neveu-Lemaire (1912).

In the purchase of hundreds of horses for the serum work of Parke, Davis & Company, there is more or less trouble as a result of the importation of lice on new purchases, and this problem becomes more acute in winter when dipping is no longer feasible. During the summer lice may be readily controlled by dipping, a coal-tar dip furnishing a cheap and satisfactory means of freeing horses of lice. During the past winter the writer has assisted the veterinary staff at Parkedale and has undertaken a few rather simple experiments to obtain a little information which did not seem to be available. The principal object of this paper is to make

those results available to others and to make public such findings as are in any way new.

In the first place, 38 horses were selected for examination for lice, taking those on which lice had been seen or where the restlessness or evidence of itching suggested the presence of lice. Of these horses, lice were found on 24, or 63 per cent, so that of cases presenting evidences of lousiness clinically, conviction in the shape of lice found was not obtainable in quite a number of cases. Of the 24 horses found infested with lice, 22, or 92 per cent were infested with sucking lice, *Haematopinus asini,* and only 2, or 8 per cent were infested with biting lice, *Trichodectes pilosus.* The infestations with *Haematopinus* ranged from very light to very heavy; those with *Trichodectes* were both very heavy. It is interesting to note that Osborn (1891), contrary to our experience here, found the biting louse most common in Ohio at the time he wrote, and says of the sucking louse, *Haematopinus*: "Notwithstanding the probable frequent occurrence of this species, we have as yet failed to meet with examples. The biting lice from horses have been secured in great numbers, but we have searched in vain for this one." Even five years later, Osborn (1896) writes of *Haematopinus*: "The biting lice have been secured in great numbers, but we have searched in vain for this one, and but few have come to hand." As regards the species of biting lice found, we are again at variance. I found no specimens of *Trichodectes parumpilosus,* while Osborn (1891, 1896) says of *Tr. pilosus*: "We have not been fortunate enough to secure examples of this form, though we have the other in great abundance." The difference in Osborn's findings and our findings as regards the relative abundance of the two species of biting lice is paralleled in Europe, where Fiebiger (1912) has pointed out that Railliet considers *Tr. pilosus* the more rare, while Taschenberg considers it the more common of the two species. Neveu-Lemaire (1912) agrees with Taschenberg.

Experiments showed a great difference in the length of time the sucking lice could live off their host as compared with the biting lice. In a number of tests, sucking lice, *Haematopinus,* lived 1 or 2 days, the last of them never surviving beyond the second day after their removal from the horse. On the other hand, biting lice, *Trichodectes,* lived from 5 to 8 days, the last of them being found dead on the ninth day. One factor which may partly account for this is the fact that both species of lice were kept in vials with small

amounts of the horse's hair, removed when the lice were collected. This hair perhaps furnished food for the biting lice, while the sucking lice, deprived of the blood which constitutes their food, speedily starved. In spite of this, the experiment indicates that stables are apt to be capable of infecting horses with biting lice for a period of at least 8 days, at the temperatures noted below, even disregarding the presence of eggs, whereas stables would probable be incapable of infecting horses with biting lice after being kept empty for 2 or 3 days at these temperatures, if we disregard the presence of eggs. The presence of eggs in stables would depend largely on whether the horses involved were shedding or losing hair in other ways. There would seem to be little likelihood of the eggs becoming detached from the hairs. Newly hatched lice of either the biting or sucking kinds died inside of two days when kept off a host animal. I have no data in regard to the humidity conditions of these longevity experiments, and only the temperature range, which was from 21° to 31° C. (70° to 88° F.). The lice would probably live longer at lower temperatures.

Louse eggs may be readily distinguished from the eggs of the bot-flies by the fact that lice attach their eggs to the hairs at a point close to the skin, so that they are not easily seen unless the hair is parted to look for them, whereas the bot-flies attach their eggs on the hairs at a point remote from the skin. Bot-flies commonly attach their eggs to the hairs, and especially the long hair, of the fore-legs, shoulders, nostrils, chin and mouth, places readily accessible to the mouth of the horse, since the larvae must get to the stomach of the host. In our experience, lice eggs were most common in the flanks and around the angle of the jaw, the latter a point not accessible to the mouth. The eggs of lice and bot-flies can be further differentiated by the fact that the louse egg is a symmetrical affair, the cap of the egg rounding off the unattached end like the lid of a barrel, while the bot-fly egg is asymmetrical, the cap of the egg being set obliquely to the longitudinal axis of the egg. The bot-fly egg is transversely striated, the egg of *Haematopinus* is finely stippled, the stippled dots being at the intersections of a network of lines, and the egg of *Trichodectes* is smooth. The eggs of *Haematopinus asini* are an opaque creamy white, 1.2 to 1.27 mm. long and 530 to 540 μ thick, measuring mounted specimens and excluding the adhesive mass that attaches the egg to the hair. The eggs of *Trichodectes pilosus* are daintier, more translucent affairs,

with an iridescent sheen, and are smaller, 830 to 880 μ long and 390 μ thick. Louse eggs are usually attached to one hair, but an occasional egg is found attached to two hairs.

A few experiments were undertaken to determine the length of time required for the hatching of *Hematopinus* and *Trichodectes.* In these experiments, eggs were collected from horses and kept in Petri dishes under atmospheric conditions of humidity and temperature. The humidity factor was not ascertained; the temperature range was the same as that for the longevity experiments, 21° to 31° C. (70° to 88° F.). The length of time the eggs had been on the horse was, of course, unknown, so that the periods obtained only serve to show that eggs may require that much time to hatch; they may require longer.

In the case of *Trichodectes pilosus,* eggs hatched in the course of 5 or 6 days. A majority of the eggs remained unopened at the end of 50 days, the young lice being found dead and shriveled within the shell at the end of that period.

In the case of *Haematopinus asini,* eggs hatched in the course of 10 to 18 or 19 days. The large majority of the eggs which were unopened when collected remained unopened at the end of 50 days. These unhatched eggs were dissected open with the following findings: About 66 per cent of the young lice were dead and shriveled; about 13 per cent were dead, but well preserved instead of shriveled; the remainder, about 21 per cent, appeared to have undergone autolysis, the egg content being fluid and unorganized. It appears likely that the failure to hatch on the part of the large majority of the eggs tested is to be attributed to unfavorable incubation conditions rather than to any common tendency to fail to hatch under normal conditions. On the other hand, the examination of large numbers of eggs collected from horses showed a majority of these eggs to be already opened, so that in a given collection of opened and unopened eggs, the unopened ones presumably include those functionally incapable of maturing or opening, which defective eggs would persist on the horse for long periods.

The length of time required for maturation of the lice on horses was not ascertained and I have been unable to find this point covered by definite experiments in the literature available to me. This is data that should be available before one can speak with certainty as to the proper intervals for dipping. Since the dips used kill the lice, but not the "nits", we must know the time re-

quired for a female which hatches right after dipping to become mature and deposit eggs, for this is approximately the period during which we may postpone dipping. We must not postpone it until the female has actually deposited eggs. The other time factor concerns the length of time required for eggs to hatch. After the first dipping we must wait until the egg deposited just before that dipping has hatched in order to kill all the lice emerging from eggs present at the time of the first dipping. The relations of the hatching period and the period of maturation determine the intervals between dippings and the number of times it is necessary to dip. Since the maturation period for horse lice is not known to me, the procedure indicated for dipping, on the strength of the scanty knowledge available, would be as follows: for sucking lice, if animals are only to be dipped twice, dip at intervals of about 3 weeks; if they may be dipped three times, dip at intervals of about 2 weeks, to eliminate the likelihood of a short maturation period resulting in egg production before the latest of the eggs present at the first dipping had hatched. As a rule, however, the sucking lice mature in 3 or 4 weeks, according to Herms (1915), and practical experience indicates that two dippings are usually ample for lice. On the other hand, the statement by Herms that sucking lice hatch in 5 to 6 days is apparently not true of *H. asini*. The same authority states that biting lice hatch in 5 to 8 days, which accords very well with our findings, and mature in 3 to 4 weeks. Under these conditions, horses should be dipped for biting lice twice at intervals of 10 to 20 days, probably 2 weeks being the safest interval. For 2 dippings, where both kinds of lice are present, an interval of about 20 days appears to be indicated.

The writer appreciates that studies of this sort should be completed and well rounded out before publication if possible. It does not appear possible to complete this study at this time, as this experiment work was only incidental to eradication work, and in view of the shortage of readily available data on this subject it seems advisable to make even this tentative contribution. Moreover, as noted later, the present war calls for all available information along the line of lice control.

As noted earlier in this paper, writers habitually discuss treatments of horse lice as though no distinctions between biting lice and sucking lice need be drawn. I take it that this is due in part to a lack of available detailed information, especially in regard to the

bionomics of these insects, on which to make distinctions. The small amount of work that we have done suggests that even in the use of dips, a treatment commonly regarded as equally effective against *Haematopinus* or *Trichodectes*, there are differences worth considering, not only in the preferred intervals for dipping, but also in regard to the relative resistance to dips and other insecticides. Tests which are yet incomplete and which will be covered in later papers indicate that *Trichodectes* is more resistant to insecticidal treatment than is *Haematopinus*.

A distinction between the effects of treatment on sucking lice and on biting lice of horses which does not appear to have been sufficiently emphasized is the fact that even contact insecticides may be simultaneously "stomach poisons" or ingested insecticides for biting lice. When the horse's skin and its hairy covering is soaked with a dip or covered with a contact insecticide of any sort, it contaminates the food of the biting lice, so to speak, and subjects them to any toxic action arising from ingesting these substances. In this way it may happen that biting lice might survive dilutions of contact insecticides that would kill sucking lice, and yet fall victim to these contact insecticides as a result of their actual action as stomach poisons. As matters stand, we would not recognize this action and would regard the death of the biting lice, which might follow the dipping rather closely, as the result of the insecticidal action by contact. This matter deserves investigation.

Along this same line, the writer would like to record the result of tests of an ingested insecticide on horse lice. In the Annual Report of the Chief of the United States Bureau of Entomology, issued in 1916, Dr. L. O. Howard notes that the work done in that bureau has demonstrated that all the species of lice infesting poultry may be readily destroyed by the application of a very small quantity of sodium fluoride. Sodium fluoride is one of the common stomach poisons used in combating such insects as roaches, and is the base of many roach powders. The method of using sodium fluoride for chickens is given by Bishopp and Wood (1917) as follows: hold the bird by the legs or wings and put a pinch of sodium fluoride on the head, one on the neck, two on the back, one on the breast, one below the vent, one on the tail, and one scattered on the underside of each wing when spread; or dip the bird in tepid water containing 3/4 to 1 ounce of commercial sodium fluoride, or 2/3 of an ounce of the chemically pure material, to each gallon of water.

There does not appear to be any reason why sodium fluoride should not be as effective for the biting lice of mammals, species of *Trichodectes,* as for the lice of birds, all of which are biting lice belonging to various genera of Mallophaga. In order to test this, however, one of the two horses infested with biting lice was treated with sodium fluoride, the powder being taken in handfuls and rubbed into the hair practically all over the body. The other horse was treated with a contact insecticide. Both horses were very lousy before treatment and both were completely freed of lice by their treatments. A number of other horses infested with sucking lice were also treated with sodium fluoride, while others were treated with various contact insecticides. The sodium fluoride treatment, as was expected, was not successful in destroying sucking lice. While a single experiment with one horse would not of itself establish the efficacy of a treatment, the fact that this success is in accord with the other known facts in regard to biting lice and their treatment makes a rather strong case for this treatment, and without caring to say that its value is established beyond question, we have no hesitancy in saying that it is probably as effective as the experiment indicates and is worthy of trial.

The sodium fluoride treatment has the advantage of being applicable in winter and it apparently does not injure the hair or skin. It has the disadvantage that it is only applicable to biting lice and that a horse covered with powder is not very attractive or even useful in some ways for the time being.

Methods for the control of lice are of special interest at this time. The bringing together of large numbers of horses from all sorts of places in war times habitually results in a rapid spread of these pests and great annoyance to the horses. This, in time, results in trouble for the cavalry and field artillery and work for the army veterinarian. And right now many of us must regard ourselves as potentially army veterinarians. If the present war makes the demands on this country which already seem possible, there will probably be a need for veterinarians in and out of the army that will require some stretching of our abilities to fill. In view of the importance which the subject of lice control may assume in the near future, I venture to summarize here a few of the control measures which may prove useful.

Obviously, the first control measure is directed against the lice present with a view to killing them. Lice are not especially

difficult to kill. The coal-tar dips are cheap and effective, and are the things most commonly used in this country. The Prussian army uses the following: Infusion of tobacco (1 to 25 or 30), with or without the addition of vinegar, which treatment has the disadvantage of being poisonous; sabadilla vinegar, also poisonous, and to be used well rubbed in at infested spots only; fish oil, which may be used in the same way; 1 part of petroleum to 10 of methylated spirit; equal parts of petroleum and rape-seed oil; 2 to 3 per cent watery solution of creolin or 3 per cent solution of liquor cresolis compound; grey mercury ointment, not over 150 grains at one application, rubbed over the entire body, either alone or mixed with oil or soft soap, taking care to keep it out of the eyes; or, in case of need, washing the horse with soapy water and, while the coat is still damp, dusting on finely sifted beech ashes or peat ashes and brushing in well. Inasmuch as soap is a good insecticide of itself, it is likely that some relief could be obtained by the use of strong soap-suds if nothing better was available. Louse powders, containing oxytoluol, crude cresol, naphthalin, pyrethrum, sulphur and other more or less insecticidal substances, may be used. They have the advantage of being available in winter weather when dips cannot be safely used as a rule; they have the disadvantage noted in the discussion of sodium fluoride of temporarily detracting from a horse's attractiveness and usefulness and are not such effective and simple contact insecticides as dips. The sodium fluoride treatment, as already noted, may be used against biting lice.

Aside from killing the lice present, there are certain prophylactive and adjuvant measures of value. Clipping horses is a great aid in lice control. Plenty of brushing and currying is another aid. Dipping the curry comb and brush in kerosene or a strong coal-tar dip when leaving one horse and passing to another is a measure of value in preventing the spread of lice; due regard must be had for the potential danger of kerosene as a source of fire loss in a stable, and for the fact that kerosene is depilatory for horses. Also, too strong coal-tar preparations irritate the skin. Shake off the excess kerosene or coal-tar preparation after dipping the comb or brush. Where horses can be curried on a picket line, it diminishes the danger of reinfection from lice and eggs which are cleaned off, since these are more apt to perish out of doors and not return to their hosts than would be the case with lice in a stable. It also diminishes the fire risk in using kerosene. The danger of trans-

mitting lice on saddle blankets, horse blankets, and bridles has not been well investigated or reported; the danger exists but it is uncertain whether it is considerable or negligible. To be on the safe side, these things should be regarded as carriers of infestation and treated accordingly. Cleanliness is almost always valuable in the control of parasites. Clean stables, frequently whitewashed or washed down with preparations of germicidal and insecticidal character, are safer than dirty stables. The prompt and frequent removal of manure and stable litter is a measure of value. Segregation of badly infested horses and quarantine measures for new animals are measures that are indicated when feasible.

It is interesting to note that a number of European investigators have stated that one way to remove the human body louse from clothing is to put the clothing on a horse. Some writers advance the theory that there is something insecticidal about this treatment and about horses. One of these writers makes the following statements: lice are rare on horses; baker's assistants protect themselves against fleas by putting their sleeping clothes with the coats of the stable hands; the Ruthenian people put their clothing over horses to get rid of lice; dogs roll in horse manure to get rid of fleas. Another writer surmises that the efficacy of the system of putting the clothing on horses is not due to a repellant odor, as stated by some, but to the lice abandoning the clothing to get on the horse for warmth and nutrition, and then perhaps being killed by the impalpable and irritant powder from the skin. These surmises are interesting without being entirely convincing. Having seen thousands of lice swarming over horses, it is hard for us to believe that a horse is an insecticide. Still it is conceivable that the human louse (Nuttall states that there is no dependable morphological difference between the head louse and the body or clothes louse), if transplanted to a horse, might die of something akin to gastralgia or even nostalgia.

In conclusion, I would like to acknowledge the courteous assistance and cooperation of Dr. R. H. Wilson and Dr. L. A. Maze in the conduct of the experiments noted here.

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ITEMS IN RECENT HISTORY OF VETERINARY MEDICINE*

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I suppose that the honor of my appointment to serve on this committee may have been conferred because I was one of the oldest graduate veterinarians in the United States. As a matter of fact, I entered Edinburgh Veterinary College in November 1854, nearly 62 years ago, I graduated from that College in April 1857, which will count 60 years next spring. If superannuation is a winning card in this case, I may add that I had to retire *emeritus* from my university position in 1908 on attaining the mature age of three score and ten, and five years later than the rule of the university required (65 years of age).

Going back to 1854, when I entered college, you will naturally look with a sense of pity on the poor student deprived of the helps that have become common in this advanced twentieth century. The founder and director of our college (Professor William Dick) had been the son of a blacksmith, but, like many another iron-worker aspired to something higher, and sought learning at the still young Royal Veterinary College in London, founded in 1792. I found him a rosy-faced old bachelor, with a large head, a self-confident look and a halo of steel-gray hair standing out equally all over and giving the head the appearance of one double the size. As text books in English we had, besides Dick's treatise, Percivall's Anatomy, and his seven volumes on Veterinary Medicine, Youatt's books one each on the Horse, Ox, and Sheep, Skel-

*Dr. Law's manuscript, as a report of the committee on Veterinary History, was received by the editor with the information that it was sent to the Detroit meeting too late to be acted upon.

lett on Cattle, Stewart on Stable Management, Morton's Veterinary Pharmacy, Dunn's Veterinary Medicines, and finally Blaine's Veterinary Art. Those acquainted with French could avail of the works of Delafond, Chauveau, Lavocat, Renault, Leblanc, Sanson, Verheyen, Delwart, Colin, Lafosse, San Cyr, Rey, Bouley, Regnal, and a host of others; in German the splendid works of Gurlt, Schwab, Hertwig, Hering, Heusinger, and many others were available. All in all the earnest student had no lack of material for profitable study. It is true that the day had not yet dawned for the study of pathogenic microbes, of microbian diseases as such, of antiseptic surgery and operations, of the suppression of animal plagues and their extinction by rigid quarantine, seclusion or slaughter, nor of immunization from such pestilences by artificially increasing the intolerance to the germ and its products in the invaded subject. And yet we could already trace the dim conception of such coming triumphs, and the prophetic reaching after the coming results by the restless human spirit. I shall always remember it as one of my greatest privileges that I met Joseph Lister (afterwards Lord Lister) and attended his surgical class in Edinburgh when he was already laying the basis of modern antiseptic and aseptic surgery. Henri Bouley whose acquaintance I made a little later gives a fine example of the then imminence of this surgical awakening in his article, in his great Dictionary of 22 volumes, on Castration by Bistournage of bovine animals with loose pendent scrotum. This is simply a twisting of the spermatic cord without wounding the scrotum, or admitting the entrance of outside germs to start infection, suppuration and all attendant dangers. The crushing of the testicle by blunt mouth pinchers acting through the unbroken skin as a second early example of avoidance of the entrance of pathogenic germs at the seat of a surgical injury. And yet this wise foresight of our early predecessors seems to have been entirely overlooked by our modern bacteriologists and surgeons.

Another example of this foresight we have in the early inoculation of pathogenic virus where the lack of a free supply of blood and lymph and with but a meagre amount of loose open connective tissue, it cannot find a congenial home, nor arouse dangerous and destructive disease processes. It has long been an aphorism that the virus from lung plagues placed subcutem, behind the elbow or elsewhere where loose connective tissue abounds, can only be done "under pain of death". But its insertion in the tip of the

bovine tail, where no loose connective tissue exists, produces only a slight inflammation and swelling, which can be easily controlled and yet is sufficient to immunize that animal against any subsequent exposure to or inoculation from lung plague. Similarly the inoculation of blackleg on the tip of the tail produces only a circumscribed and easily controllable local disease but fortifies the animal operated on against taking blackleg from any future infection. In both of these diseases the germ finds difficulty in survival in the circulating blood and it is only where it can produce an excessive liquid exudation and thereby compress or even obliterate many of the blood vessels and lymphatics that it can survive and produce its habitual deadly action. The interesting point is that the then densely clouded human mind penetrated its besetting fogs and conceived the possibility of a great good, though the world had still to wait long and patiently for the full elucidation of the modus operandi by which the benefit was brought about. It is easy to adduce other instances of the exercise in the early days of a sound judgment in the restriction and extinction of plagues of animals and men, long before the modern recognition of the microbian causes of the pests. Among these is the setoning of young cattle to prevent blackleg, the benefit coming from the attendant suppuration and purulent discharge which kept the wounds exposed to the air and lessened the violence of the blackquarter when inevitably started in such quarter-ill-infected districts. So also when the widespread practice, in sheep-pox districts, of inoculating from mild cases of the disease so as to pass all through a non-fatal yet immunizing attack. This sheep-pox immunization probably originated from the small pox immunization of men long practiced in Arabia, Persia and China and introduced into western Europe by Lady Mary Montague. Prior to this small pox had been universal. The most impressive example is that of the successful extermination of rinderpest in Great Britain in the middle of the 18th century in the absence of all knowledge of bacteriology. From the beginning of the century rinderpest had spread over Europe in connection with the wars of Peter the Great and later military leaders and in 1715 and again in 1745 it reached England where in three years it swept off 3,000,000 head of cattle. It was finally brought to an end by stopping all movement of cattle in infected districts, and by the slaughter and deep burial of all cattle in infected herds, followed by thorough disinfection of the farm build-

ings. It was only in May, 1865, that the disease made another eruption into England when the public mind had lost all knowledge and memory of the three years scourge of a century before. High class medical men, dignified officials, and others vied with each other in advocating all sorts of specifics and remedies. Even my now venerable preceptor, the founder of Edinburgh Veterinary College, entered the lists and prescribed for the cattle attacked, and when this prescription was proved useless, as shown by the ever increasing number of deaths, advocated the formation of quarantines where the victims could be segregated and treated until recovery or death. Deaths continued greatly to predominate. Prof. Dick found himself in a most unenviable position. He had indoctrinated his students that "Veterinary Medicine was only a system of Common Sense", a plea that none could rationally dispute. The only question was whether in the matter of rinderpest, he had not himself parted with his common sense. But he went further, he had assured us that rinderpest was a mere result of impaction of the manifolds, and, that its transmission by contagion was all a delusion. For the first time in his life he was now confronted by the Russian cattle plague and could not close his eyes to the fact that it was as easily communicated and as fatal to the slop-fed dairy cows of the large cities and the turnip-fed steers, which were continually in a state of mild diarrhea, as it was to the hay and grain fed steer, or growing heifer. His trouble was that he had won over to the doctrine of the great Sydenham and others, that epidemics were caused by conditions of the air and earth, and with which contagion had very little to do. He gleefully told his class of an Edinburgh lady bringing him a favorite dog, and when he had satisfied his esthetic soul by feasting his eyes on the lady herself and had turned to the canine patient which had been meanwhile licking his scratched hand he found to his horror that the dog was mad. He did not, however, contract hydrophobia and congratulated himself that he had now secured another and stronger proof for his favorite theory. To us, who had never yielded to Sydenham's dogma, it had the effect only of a warning against attaching undue importance to an unessential accessory influence which might secondarily affect the progress of a disease which it was powerless to produce. To you who have grown up under doctrines and demonstrations of microbiology such a warning would be scarcely needed. In view, however, of the present conditions of

world politics and war everyone should carefully avoid every tentendency toward letting non-essential matters or considerations dominate the mind so as to beget an obsession that will render impossible just judgment as to what will best serve the interests of humanity, civilization and progress.

RINDERPEST. Rinderpest furnishes an example of a disease which, out of its native home in Asia, and among cattle, other than those primitive and aboriginal to that native home demands most vigorous and inflexible measures for its extinction, and where the sanitarian should never rest satisfied with a resort that comes short of thoroughness and effectiveness. The following are among the reasons for this course:

1st. Incubation is short, usually four days, a rise of temperature being usually present after the second day. In the plains of India the latency is very much longer, due probably to insusceptibility in races of cattle long habituated to the plague, so that susceptible strains have been killed out.

2nd. The number of races susceptible. Cattle are not alone receptive to the disease but all ruminants and at times pigs are liable to take and carry it.

3rd. The virus—an ultravisible filterable one—is transferred from animal to animal with great readiness. Man, horse, dog, cat, mouse, rabbit and bird are immune, but can carry the virus.

4th. Flies, bugs, acari and ticks, also the many parasites can carry infection.

5th. Harness, halters and clothes carry virus.

6th. Virus can blow on air, on light objects, hay, straw, fodder, hair, wool, feathers, leaves, down, dust, etc., without losing its virulence.

7th. The virus is present in the body in all its secretions and excretions, feces, urine, milk, nasal and oral mucus, tears, sweat, dandruff, ear wax, sebum of prepuce and vulva, hoofs, horns, etc., blood and pathological exudates.

8th. The fetus, fetal membranes and discharges are infecting.

9th. The virus does not easily nor quickly part with its potency, so that when dried and salted in hides it is usually harmless, it yet remains infecting on stalls, mangers and racks in darkness and stillness, for three months, (Müller, Dieckerhoff) in feces for one month (Bouley) to five months (Krajewsky), in dried bones for one month, in hay packed in a barn three to four months

(Haubner, Dieckerhoff), in blood in a sealed glass tube one month (Semmer), in glycerine 8 days (Edington), and in fresh flesh four days (Arloing). Thus when secluded from light and air its destruction becomes very problematical.

10th. When inoculated on animals of only slight susceptibility as on camels, dromedaries, buffaloes and swine or on the less receptive ruminants in the aboriginal home of the plague, its eruption is liable to be delayed and the attack mild so that the cases of this kind may receive little attention or even recognition, and a wide extension may occur without requisite control.

11th. Rinderpest is so readily transmitted to susceptible races of cattle, and attacks them so universally when exposed, that the herds attacked are speedily exterminated and any neglect or slipshod administration in dealing with it is to the last degree ruinous. The sale of inferior meat at a freibank, so long continued in Germany, was a distinct invitation to the extension of this as of other contagious diseases.

My practical acquaintance with the disease began in 1865 in Great Britain. Imported from Revel, Russia, a cargo of cattle was landed at Hull, May 29th and sales made to go to London, Derby, Leeds, and many other places. Early in June sickness appeared and spread rapidly in places where these cattle had been taken, and by the end of July the infection was seen and recognized among other places in Edinburgh and even as far north as Aberdeen. The deadly nature of the disease drove owners and purchasers of exposed cattle to turn them again on the market, so that the infection spread with daily growing rapidity. In their dire extremity the stock owners blindly resorted to any brazenly lauded remedy, however absurd, and as the father of veterinary medicine in North Britain had long treated Russian cattle plague as a hoax, they could hope for little from him. The overwhelming nature of the calamity made even him prescribe for it, and, when his remedies proved, if possible, even more useless than those of the quack and M. D., he attempted to save his face by advocating a quarantine where all sick cattle could be secluded. They were accordingly removed to this asylum on foot, or in wagons, open or closed, spreading infection in their way, overcrowding the hospitals and making it within a few days an abode of the dead only, in place of the living, and a charnel house of concentrated infection. As my former preceptor and friend John Gamgee was absent in London, I had to

stand in the breach and beside an occasional letter to the "Scotsman", I contributed a long series of weekly articles to the "Scottish Farmer" which were widely read and highly appreciated. These contributed to enlighten the stockowners of the North as to the nature of the imported epizoötic, its dependence on contagion only, its deadly course, and the utter futility and folly of relying on medicinal treatment, or any kind of segregation which involved the movement of exposed and infected animals or their products from place to place. I became of course, the butt of many angry and would-be wise sayings by those connected with cattle traffic and was often reminded that "your business is to cure and not to kill". The critics could not see that the real slayer was the deadly plague and that unless its greedy maw could be shut, the splendid bovine stock of England was to be practically exterminated, and the much admired and envied English Agriculture virtually abolished for a length of time. They could not see nor appreciate the continued immunity of continental countries and territories that bred and exported their indigenous cattle never brought outside cattle within their own land. But surely they could have opened their eyes and their minds to the fact that countries that raised their own aboriginal bovine races, and sold them outside but never admitted strange strains of blood, remained uninfected and untarnished throughout, while those that kept up a trade from without, were plunged early and persistently into the throes of the pestilence until all cattle had been cut off, or the survivors had recovered, themselves immune; and when their infecting products had been sterilized by disinfectants or exposure, before the next crop of calves arrived, these remained safe and harmless. Thus throughout the 18 months of its prevalence it scourged but two counties (Denbigh and Flint) in Wales, out of a dozen. In England, the county reports issued weekly by the government show a long continued immunity of those shires situated out of the line of cattle traffic, and above all of such as raised an exclusive race and never imported cattle of any kind. The lake country, (Westmoreland) long remained free. Scotland offered a still better illustration of the disastrous effect of cattle trade during an epizoötic. The counties of Wigtown and Kircudbright, the aboriginal and exclusive source of the famous Galloway cattle reported not a single case throughout, and the same was true of the mountainous and island uninvaded native home of the West Highland Cattle, Argyle, Bate, Inverness, Nairn,

Banff, Moray, Ross, Sutherland and Caithness. The great islands of Scotland, (Hebrides, Orkney, and Shetland, like the Isle of Man and Ireland) were similarly spared. The Channel Islands, which rigidly exclude all but their own treasured primeval stock, completely escaped this as they did all other bovine plagues, before and after. Such a record for those who kept open eyes and mind, settled for all time the causation by contagion, or better, by an organized, self-multiplying and self-propagating germ, as yet undemonstrated by microscopic or staining methods, but an allsufficient reason for devoting every effort to the extermination and later to the exclusion of this as yet unseen cause. A century earlier Great Britain had been forced to this conclusion by the stern logic of effect and cause, and had driven out the invader from her fields and shores by rigid seclusion, killing and sterilization. Once again she saw the light and in defiance of all protests of commerce and trade, she once again banished the pestilence from her herds. The highest weekly attacks mounted to over 17,000 head, the invaded herds numbering 37,774 animals and, as practically all such herds suffered, and 90% died, it bade fair to make an end of British cattle. All movement of cattle, sheep and swine in infected districts was forbidden, all infected animals killed and buried, all visitors were debarred, and all buildings, yards, stockcars, etc. disinfected. The effect was to at once greatly reduce the weekly record of new cases and very soon the pest was a thing of the past. The very nature of the disease strongly contributed to this success; the mortality rendered concealment impossible, any disposition to hide hastened infection, and filled the buildings, yards or pastures with the dead; the herd was doomed in any case and violation of the law forfeited the claim upon the government for indemnity. There was no temptation in this case, as is constantly present in less fatal diseases, to violate the law, and the statute operated without a drawback.

Immunization. The latest resort, however, to be adopted in this enlightened age is to immunize the stock by individual inoculation. This is an advance truly. But as in the case of all other plagues the question rises is it a purely beneficial advance in the case of this disease, without any attendant drawback dependent on qualifiying conditions inherent in or surrounding the animals operated on, and on other animals that they may later infect? Long before the days of microbiology, microprophylaxis or microbio-

logical therapy, before man thought deliberately of artificial immunization at all, they had reached the conclusion that the ideal methods of dealing with rinderpest was to exterminate the cause from a country, or better still, from the face of the whole earth. This, and this alone, could save our future livestock, for all time, from its depredation and from the ruinous losses that must otherwise recur from time to time whenever control went napping, in the face of the continued existence of a deadly plague that it had been at all possible to stamp out. Would it be economical or uneconomical to devote other animals to the production in their systems of the protective microbes, its toxin, opsonins and the resulting defensive materials, to intelligently inoculate each particular animal and to see that due care is taken to prevent the escape of anything that then or later may prove injurious to other animals? The preservation of the animal inoculated is not by any means, the only thing to be considered, and the man who stops at this is by no means a safe person to entrust with the direction or administration of the inoculation. Let us consider the immunization from rinderpest in the light of the above consideration. The methods already worked out are: 1. The fresh bile method. 2. The glycerinated bile method. 3. The method with serum immunized and virulent blood. 4. The method with serum of immunized and subsequent exposure.

1. The fresh bile must be obtained from an affected animal on the sixth or eighth day of illness and must be absolutely free from blood. The animal furnishing the bile must therefore be sacrificed to furnish the material, or at least its life must be most seriously imperilled. A dose of 10 c.c. does not immunize the inoculated under ten days and not always then so that a second dose on the next day, became requisite, followed, two weeks later by a small dose of virulent blood, which on its part often proves fatal.

2. The mixed bile—(glycerine 1 to bile 1)—in a dose of 20 to 50 c.c. had also to be followed a few days later by a small dose of virulent blood. But this too, often failed, so that in both cases alike there is a serious outlay, a long continued risk of escape of infection, and a very uncertain result.

3. Simultaneous method—the inoculation at one time on different parts of the body, of the blood serum of an immunized animal and the virulent blood, requires the same long continued watchful care of infected animals, with attendant risk of escape and

diffusion of infection, to be followed by a new outbreak whenever this reaches a susceptible herd, and by a maintenance of the pestilence for all future time, in place of a complete extinction, which economy and sanitation demand. In cases where immunity is secured it begins not sooner than fourteen days after the inoculation whereas in an infected herd the disease is contracted at once, and incubation is passed in two to four days.

4. The serum alone (sterilized serum) method, if truly serum alone and that *sterile,* would be safe apart from the risks attending on its preparation, but the rule is laid down to mix the infected animals at once with diseased animals so as to infect them at once and pass them through a mild, non-fatal form of the disease, when they will resist any new invasion for several months.

We find therefore that all forms of immunization recommended are but so many means of passing the animal through a mild form of the disease with the attendant dangers of the extension and perpetuation of the infection. Is it too much to say that rinderpest can never be got rid of in this way? But, all of these methods have, or ought to have reference to the plague as already existing in the herd when the disorder will be contracted inevitably and when, or if, the animal recovers it is of necessity immune. No one of them ought to be applied to herds nor districts, in which the infection is not already present.

Aphthous Fever. Foot-and-mouth disease. I select this pest as being a close counterpart of rinderpest in its extreme contagiousness, its rapid and almost infallible extension from one victim to the next, its short incubation 2 to exceptionally 6 days and its rapid progress to a climax—4 to 6 days—: it differs from rinderpest in its minor manifestations, the fever being materially lowered when the eruption appears, and, if kept free from filth and physical or chemical injury, in its rapid recovery, the illness being usually over in 8 to 15 days. Fever may run high in the first two days but is lowered as eruption appears and unless local sores are aggravated by mismanagement is soon barely perceptible.

The local lesions may show wherever inoculated but are usually confined to the mouth, teats and feet, or to one or two of these parts and this localization is almost pathognomonic. When implanted in the nose, by the prehensile tongue, it develops on the muzzle and nasal mucosa as well, and when swallowed in milk or fodder the fourth stomach and bowels suffer, usually with a fatal result. But this latter is very exceptional.

Aphthous Fever further contrasts with rinderpest in the variety of animals susceptible. While cattle, sheep, and swine are the main sufferers, all cloven footed animals, wild and tame, are subject to it, and man has very often suffered even from the intestinal form, in consequence of drinking the milk or consuming the butter or cheese from an infected dairy. Horses, dogs and cats are less susceptible, though in New York in 1870 stomatitis developed in these and even in chickens consuming the warm milk. On the European Continent, where the disease is constant, and immunity likely, these latter animals failed to contract the disease by inoculation.

The *diagnosis* of the affection is not difficult to the experienced observer, the introduction to a herd or premises of one or more strange animals from a suspicious source, followed by a sudden and rapidly increasing number of cases of sickness, with high fever, hot, tender mouth, froth around the lips, drivelling of stringy saliva, redness of the buccal mucosa, and the appearance of red spots followed by blisters on the inside of the lips, gums, tongue, and it may be the cheeks and soft palate, these vesicles covered by a whitish or grayish epithelial envelope and later when the blisters have burst, each shows a red, raw base more or less rounded, or irregular by coalescence of several bullae. At times the entire tip of the tongue is one uniform red, angry sore. A marked feature is the "*smacking of the lips*" or rather of the tongue and palate, audible at some distance. When udder and interdigital spaces are involved, similar blisters show on the hot, burning teats, and in the arch between the hoofs, attended by shrinking when the teats are drawn, and lameness when moving. A striking symptom is the stretching out backward, and shaking, of each hind foot in turn, as if to dislodge some irritant. The blisters in these two last situations are early ruptured so that what is usually seen are rounded sores or scabs on the teats, and an open sore from back to front of the whole interdigital arch.

The simultaneous attack of mouth, teats and feet is very diagnostic, and this usually occurs in dairy cows; in heifers the teats may be omitted, and in sheep and pigs the eruption may be apparently confined to the feet, the mouth and teats being largely respected, or so slightly attacked as to be easily overlooked. But the fact that cattle, sheep or pigs have usually been brought in from a strange place, from market, or highway, and that cows,

sheep and pigs, if herded together, have been simultaneously attacked is very characteristic of the disease, and the *"smacking"* by the cattle, and the nature of the blisters on close examination, make a conclusive diagnostic picture. There should not be a mistake unless the attack is still so incipient that the blisters are not yet clearly formed, or unless they have already broken and largely healed, when they may be confounded with ergotism or other cryptogamic sores, with those of bacillus necrophorus, with streptococcic cellulitis, with common foot rot in cattle and sheep, with cowpox, with vesicular emphysema of breeding cattle, with actinomycosis of the tongue, and with a dozen other injuries and diseases. I may be told that one must not be too particular when fighting an animal plague but must kill the suspected beast, or beasts, and bury them, *"the dead tell no tales"*, and our blunder is not going to spread infection. But it may sometimes do worse. In 1884 I had to stand in the breach when a number of herds, in three stock-breeding states, and suffering from *gangrenous ergotism,* had been condemned for foot-and-mouth disease and the states quarantined in consequence. For the sake of sceptical professional brethren, as well as for the state officials and stockowners, I staid long enough to demonstrate by inoculations that neither sheep nor swine were susceptible and had the satisfaction of seeing the embargo quarantine raised, an open harmless cattle traffic restored to the states involved, and the stockmen informed as to the *real* danger, causes and prevention of ergotism. Yet at not infrequent intervals I see the statement repeated in public prints that Illinois, Missouri and Kansas suffered an invasion of foot-and-mouth disease in 1884. Those shortlived quarantines, though withheld from their full evil results at that time, still remain on the books as matter of record, and for all time to come the undeserved slander will be repeated against these territories.

On another occasion, in 1908, I stood beside a long trench dug for interment of a large herd which had been drawn from several states, and were now supposed to be infected with foot-and-mouth disease.. This herd had chronic lesions in the mouth, with white necrotic margins, such as come with mycotic invasion from faulty fodder, but without any active inflammation. with no fever and with no observable lesions elsewhere. Fortunately the order for their slaughter was held up until another diagnostician had passed upon them, and as his decision was justified by the

negative result of inoculations, and of inquiry into their antecedents, and the sanitary condition of the states from which they came, the sentence of death was revoked and the cattle of the states furnishing them were saved from quarantine and ruinous depreciation. Had the sentence been executed and had the herd gone into the ditch of condemnation, an indelible stain would have been put on every state from which any member of the herd had been drawn and no one can calculate the resultant losses to such states. A succession of cases of this kind cannot fail to ultimately throw discredit upon a worthy profession, and indirectly on all scientific work. Science is knowledge, and true science cannot be dissociated from justice. The charlatan may hoodwink the public for a time, but the day of reckoning comes sooner or later; knowledge and truth can alone raise a good and permanent construction.

Drawbacks to Slaughter as a Measure of Sanitation. The wisdom of an uniform slaughter of infected herds must always rest on the nature of the pestilence, its infectivity, and its inherent fatality. Slaughter was early and successfully applied to rinderpest and lung plague, both diseases with a large mortality, and the latter with a very prolonged incubation, and, in cases of recovery, a tardy return to health on account of the necrotic sequestra in the affected lung. When we turn to *foot-and-mouth disease* we find that the affection is mild and of short duration, while death is all but unknown when the victim is placed in otherwise good hygienic conditions.

Death rare. From the importation of the foot-and-mouth disease into the British Isles in 1839 to its extinction in 1886, the deaths from it were practically negligible. In Scotland, the rule was for farmers to purchase their steers at the Fall market in November, and as all approached and left the market over the highway, and as all entered and left the field by one or several narrow gates, over ground puddled into a mortar-like mass, it was rather exceptional that any herd escaped infection. On reaching the feeding farm, they were usually turned into pasture, where in the first week they showed the disease. By the end of the second week, if the weather was inclement, they were turned into the feeding yards and boxes, until they came out fat in the spring. Losses were unknown to the farmer. There was of course some loss of weight during the two weeks of illness, usually the first only, but that was soon made up when they came on turnips and linseed

cake. The average gain in the feeding pen was two pounds daily. When dairy cows were affected there was a loss on an average of $25. per head, including the sacrifice of all dairy products, but death was unheard of. No claim was ever made for the value of an animal that had died, nor was such a probability as death from this disease ever thought of. Though herds were infected in the fall by the contaminated animals purchased for feeding,or dairying, and, (unless additional purchases were made through the winter) their successors in the same stalls and boxes in the spring never contracted foot-and-mouth disease. Not one of the crop of spring calves in the dairies ever showed a sign of this malady.

The sad losses from *lung plague,* since the inauguration of free trade in cattle from the Continent of Europe, led to the formation of at least seven Live Stock Insurance Companies to reimburse their members when pestilence invaded their herds, but all got into financial difficulties in a few years and most of them suspended their operations. The striking feature of these societies is that none of them ever recorded the payment of an indemnity for an animal that died of foot-and-mouth disease. McMinn's Statistics for Scotland of the Agricultural Cattle Insurance Company, covering a period of six years (1855 to 1860) when aphthous fever was rampant, furnish 1474 deaths, but not one of these was from foot-and-mouth disease.

The reports published in the London Veterinarian for the time succeeding the importation of the disease, recorded the progressive extension over those parts of the nation invaded, at a time when stockmen were in a state of consternation, but it gave no records of deaths, in most marked contrast with the reports of lung plague, in which the list of fatal cases were the prominent feature. And this be it noted was during a period when there was no government slaughter of infected and diseased stock. Fatal cases in all diseases had full opportunity to manifest themselves, and had there been a manifest mortality, the terrorized stock owners would not have been slow to complain of it.

In the invasion of Canada and the seabord northeastern states of the United States of America, in 1870 the same tale was told. The infection came in a shipment of cattle from Great Britain, and landed at Pt. Lewis, across the river from Quebec. They had suffered from foot-and-mouth disease on the sea passage, but had apparently recovered when landed, and were sold to go into differ-

ent parts of Quebec and Ontario. The disease followed in the various thoroughbred herds into which these animals were taken, and near adjacent herds and the maritime provinces of Canada suffered an extended outbreak. But there was no greater mortality in Canada than there had been in the previous 31 years' prevalence in Great Britain, and then came the turn of New York.

The first center of infection was reported as at Oriskany, Oneida County, N. Y., in September, less than ten miles west of Utica where the State Fair was held during the same month. It was said to have been brought in by Canadian cattle, and whether in *Cattle* or by other *carriers,* it undoubtedly came through that channel. It followed its immemorial habit of extending along the lines of cattle traffic, until it had stretched its sway over nearly all of eastern New York, New England and New Jersey. I followed its course in my own state, and found each invaded herd universally sick, the flocks and pigs suffering wherever brought in contact with the sick stock, or the infected premises, and a sprinkling of other genera, including some human beings, showing characteristic lesions. Fortunately the cattle trade was mainly from west to east, the few thoroughbred cattle to be sent west being held for a length of time to avoid all risk of shipping contagion, the affected stock were soon in winter quarters, the dairy farmers were so disgusted with the affection that they did not attempt to break the voluntary quarantine, the passenger birds were soon all gone for the winter, it was happily before the days of the English sparrow and starlings in rural New York, and as stockmen were assured that there was no danger of losses by death, there was no temptation to dispose of forage which would all be needed as feed for the herd when recovered. Fortunately too, our farms were all fenced, and the pastures died down under the frost so that there was no risk of the mingling of herds on a common field. The guardians of the stock were strongly enjoined not to allow visitations by man nor beast from herd to herd, and that no products of the dairy should be sold until the stock had fully recovered. *No deaths occurred.* By the time the spring calves came, and the cows freshened, the infection had become nonvirulent, none of the young suffered, and the dairy products could safely be sent anywhere.

Those who were morbidly obsessed in favor of universal slaughter of infected herds have without shadow of reason announced that this invasion of America in 1870 was a mild form of the disease

and that it was on this account that it failed to extend and perpetuate itself in this country at that time. If this means anything, it means a lack of *virulence* on that occasion. But this means the absolute defiance of the notorious facts of the case. The malady imported had proved that it was of unusual virulence for a year or two just preceding its importation, that by virtue of this infectiousness it had defied all restraint and spread over the Continent in general, that it had made an equal extension, in defiance of all restrictive efforts, in the British Isles, that the shipment to Canada, composed of carefully protected, high class, thoroughbred cattle had found it impossible to reach the quarantine of the Atlantic steamer without bearing the infection in their midst, that although they passed through the disease on the ocean, they had so far recovered that they were received as sound animals when they left the ship, that though they were disembarked at Port Lewis in August, the infection carried by them had spread widely through both Quebec and Ontario and early in September it was already ravaging Oneida County, N. Y. This is not the history of a disease of minimum virulence.

But it did not stop here. It continued its triumphant career for months, spreading rapidly and widely in eastern New York, New England, and New Jersey, until it again reached the Atlantic Ocean without a craft to bear it back to England. They were badly off for argument who assumed that it was lack of potency that led to its complete suppression and disappearance at this point. It was rather its all but uncontrollable virulence which defied any and every limit to its extension and included in its successful domination every animal in every herd that it once entered, that brought the invasion to an end. No herd was affected in part only, every bovine, ovine, and porcine animal within reach succumbed with unfailing promptitude and certainty, the whole group passed through the disease at the same time, recovered simultaneously and became without exception immune. Had it been less virulent, had it taken one animal today and another next week, advancing in this leisurely way, there would have been a different tale to tell and a complete subsidence and disappearance of the pestilence would have been virtually impossible. It was the remarkable potency of the virus rather than its weakness that at that time saved the nation from a still wider, or an universal infection. It was the quarantine, voluntary as it was, and the equally voluntary disinfec-

tion of the infected premises and things that called a halt to the hitherto unconquerable assault of the pest.

It was further claimed that the severity of the winter frosts, bound up the virus until danger was past. But this argument is equally baseless, and equally fatuous. The invasion of New York took place in September when frosts are rarely seen and never continuous. Moreover, the whole history of this disease in its primary homes of Siberia, Russia and Northern Europe, has shown no such subserviency to frost. And in these lands, too, with ample supplies of roots for winter feeding, and where the hibernal solstice was the great period for putting up to fatten. Assuredly if frost could of itself stop the progress or existence of infection, the fact must have been long a household word in Northern Europe and Asia. But neither Europe nor Asia has given a hint of such an occurrence. It is true that extreme and rigorous cold which necessitates the shutting up of all animals indoors, has always contributed, and must always conduce, to the rapid progress of infection through a herd and to prevent the extension to other herds that are not in direct contact with the infected subjects but *it is the rigid seclusion and quarantine,* rather than the freezing up of the virus that must be charged with the result. The germ of the disease lives in the warm body of the animal and propagates there, and wherever animals can live together they always find it easy to communicate infection. Ice tends to preserve the disease germ and other ferments; it is the non-freezing weather that is most favorable to rapid loss of potency by air, light and electric conditions.

It would be easy to adduce further evidence that the uncomplicated foot-and-mouth disease is anything but a *fatal* malady, but the above ought to suffice. This may be a *fatal* excess of optimism before this audience, seeing that one short year ago a resolution designating this disease as *fatal* was proposed in this association and bade fair to be adopted, but for the timely correction by Dr. Torrance. We should bear in mind that a gross misstatement, repeated often enough and with sufficient force, is likely to be accepted by a majority who have had no means of putting its truth to the test. Yet for the minority who know how baseless the assertion is, nothing could more thoroughly undermine confidence in this association.

Causes of Prolonged Latency of the Germ. It would be wrong to entirely omit the cases that have been supposed to be

causes of prolonged incubation and by which the disease is sometimes propagated when the first victim has apparently recovered. Many such cases and their causes are obvious enough. Others may be traced to occult condition to which the mind of the practitioner is not alert, because they are never recorded in systematic treatises.

Infected fodder or litter, closely packed, so as to exclude air and light, retains infection much longer than when fully exposed. In free air these become non-virulent when exposed to a temperature of 88° F. till dry. They remained infecting for nine months when kept at a freezing temperature.

Again in the *non-vascular hoof* the virulence is sometimes retained for weeks or longer after apparently complete recovery. The invasion of America in 1870 was a case of this kind, the animals arriving at what appeared to be fine health and condition. The disease was at the time very prevalent in Great Britain from germs carried by cars, roads, or otherwise, and the cattle were probably infected on the way to the ship, if not even from the ship itself. Certain it was that the cattle passed through the affection while crossing the Atlantic, and their health appearing good on landing, they were sold without apprehension to go into different herds in the provinces of Quebec and Ontario. It became at once widely spread in the susceptible herds receiving them, and in others through sales. The imported cattle were landed at Point Levis opposite Quebec in August, and in September the disorder appeared at Oriskany, Oneida County, N. Y., less than ten miles from Utica where the State Fair was to be held the same month. From this point it quickly extended along the lines of the N. Y. Central, Harlem, and Boston and Albany railways into Eastern New York, Massachusetts, New England generally, and New Jersey.

From this time on until 1883, when federal quarantine was imposed on all imported cattle, infected cattle were imported at intervals and taken at once to their destinations inland, where the herds receiving them forthwith contracted the disease, as usual without an individual exception in a herd. Letters in live stock journals attest this and the different outbreaks supervening at once on the arrival of the infected cattle, and the facts that no member of an invaded herd escaped, that all suffered from the same characteristic symptoms, familiar to the reporters from a long personal experience with the disease in Europe, that all recovered in about 15 days, make it virtually impossible that there could have been

any mistake in the malady. These herds were all valuable, thoroughbred animals, and their owners well acquainted with the nature of the trouble, and conscious that the disposal of these animals at once would destroy their business, refused to sell or deliver any for a period of three months, and until after disinfection, and in each case the infection was confined to the herd as in the Scottish feeding farms already referred to. In the nature of things each such invasion must in its initiation have presented an exact counterpart of the great invasion of 1870. They doubtless contracted the disease on their way to the ship, passed through it on the ocean, seemed well on arrival, and were taken to their destinations, only to infect other stock from their seemingly healthy feet, teats, mouths, etc.

One other case of this kind occurred shortly after the federal quarantine was established at Portland, Me. The appropriation was not adequate to provide sites at the docks or even on an island where animals could be disembarked and quarantined. From Jersey City the cattle had to be carried in closed railroad cars to Garfield, and at Portland they had to travel, a mile or more, over the highway to the quarantine station. In 1884 a shipment from England arrived at Portland in apparently good health, but two days later complaint was made that two work steers that had followed them over the same path were ill with foot-and-mouth disease. The imported stock had been examined on landing, by Dr. E. F. Thayer, of Massachusetts, who found nothing amiss, and had there been any tenderness, lameness, or any remaining lesions on the feet, teats or mouth, it could scarcely have escaped detection, for Dr. Thayer was a very accomplished and observant man. He had studied in medical schools, and had spent some time in British veterinary colleges to good purpose. He had had long experience, and his value was generally recognized. He had served two years as president of this association (1869 to 1871). He had served his state nobly in *stamping out* its then prevalent lung plague, and he was now, with myself, a professional member of the U. S. Treasury Cattle Commission. Here again then we had convalescent animals, with no remaining visible sign of disease, which notwithstanding this left on the public highway enough virus to contaminate cattle that passed over the road later. Both lots of cattle were carefully isolated, both recovered, did well, and neither con-

veyed any further infection to other stock, though after leaving quarantine they mingled constantly with susceptible animals.

Beside the *nonvascular hoof of cattle, sheep, goats* and *swine*, we must consider also the *horny claws of birds, dogs, and cats,* the *hoofs of horses,* and even the *bills of birds,* all of which may imbibe the virus from *liquid infesting material* (*wet manure, urine, milk, contents of vesicles, blood,* etc.) when they scrape, scratch or peck among such matter.

Still more likely to hold and unduly preserve the potent virus are *hoofs injured by the rasp, by mechanical injuries,* those *detached by suppuration beneath them, which separates the horn from the subcorneous tissue,* and finally when the *new and spongy horny growth* stands out from the vascular tissue beneath.

Also the *breaches and distortions* caused by the *coincident* occurrence of foot-rot, and the development of *a ragged and irregular growth of horn.*

Gangrenous ergotism with *separation of the horn from the quick, shedding of the horn,* and *necrosis of even the bones and tendons, up to the coronet, the fetlock and sometimes the hock,* makes an admirable bed for the virus and a means of prolonging its potency.

The *bacillus necroseos* (*necrobacillosis*) may attack any part of the body, but is especially liable to be located about the mouth in young sucking animals, and on the feet so that it may be mistaken for *foot-and-mouth disease.* Wherever planted it leads to extending death of the tissues so as to furnish an appropriate culture-field for preserving and multiplying the infection; it forms therefore one of the worst complications of *aphthous fever.*

I should add to this *all skin diseases with cuticular thickenings and desquamations, hypertrophied epithelium or parts exposed to constant friction, desquamation, epidermic pads, and scabs, brisket disease, erythema, vesicular eruptions in skin or mouth, pemphigus, ecthyma, impetigo, acne, porrigo, erysipelatoid eruptions, blacknose in sheep, harness sores, floor bruises and sores, irritation from fecal secretions, soaking with urine, alkaline, acid or saline caustics, mycotic, bacterial or other infection and growths, ringworm, fusariasis, rusts* (*uredo*), *puccinia, mould,* (*mucor*) *fungus, saccharomyses, diphtheria in calves, croupous formations in mouth, throat, bowels and air passages, abscesses of all kinds, dermoid cysts, calcified dermis or cuticle, solid concretions and calculi in*

bowels, liver, gallducts or bladder, pancreatic gland or ducts, pultaceous accumulations in tonsillar or Peyer's follicles and above all *in the sheath of the castrated male bovine.*

In the streptococcic infection of the connective tissue, joints and tendons of the digital, metatarsal and *metacarpal regions,* the virus may find a place of concealment and preservation, if not also multiplication, in encysted pus, as well as in necrotic and semidetached tissue.

In the *udder,* the *teats* are especially liable to become foci of infection and no less the *glandular and connective tissue of the mammae.* On the former the vesicles, broken in milking, are followed by scabs in which the virulent matter is enclosed and dried up; in the gland pus sacs form and in the milk sinuses and gland tissues are often purulent collections, holding and even cultivating the morbid germ. All of these are separated to a greater or less extent from the circulating blood and are thus saved from the antimicrobian and antitoxic action which retards microbian growth and destroys germs.

In the mouth various disease-products tend to envelope and preserve the germ. Thus the following act more or less in this way: *actinomycosis, cancer, epithelioma, bone softening in young and old, fractured jaw, loosened teeth, suppuration around the tooth fangs, pus pockets on the root or in the papilla, dentinal tumors, suppuration in the tonsils, in the pharyngeal or laryngeal walls, in the soft palate,* or *sinuses, decayed and hollow teeth, superfluous teeth, over-grown teeth, sharp edge on teeth with open wounds of the cheek, injuries from use of gag, probang, or looped wire,* etc. The rule holds here, as elsewhere, that where we meet with absorbent, nonvascular tissues, and especially when, as in the mouth, they have been freely exposed to an extremely minute, filterable virus, such virus may be held to be protected for a longer time against devitalization or destruction.

The same consideration would apply to the *sarcocystis* (*Guischer's* or *Rainey's* tubes) a zoophyte found in the muscles of nearly all genera of animals, encysted in the fibre and at a more advanced stage in the connective tissue. These created a great furor in Great Britain in 1865 in connection with the prevalent rinderpest, but its wide distribution among animals, discovered later, showed that its presence had no direct connection with that disease. The experiments of Theobald Smith and Darling in suc-

cessfully transmitting the infestment from mouse to mouse, by feeding, implies a possibility of it acting as a "bearer" in *foot-and-mouth* and other similar affections.

In the same connection must be named the familiar *Trichina* which like the sarcocyst often abounds in the lingual muscles and is capable like it of absorbing and *"carrying"* the infra-microscopic germ. They will become even less resistant to the germ when they perish in the tissues and remain as dead material.

The same remark applies to the *Linguatula taenioides*, which has been found in the nasal sinuses of sheep and goat, and to the much more familiar *larva of the gadfly* (*Estrus ovis*) which hibernates in the same cavity.

Leeches attached to the *fauces or pharynx* should be named here as possible *"bearers"*. Also those forms of *chronic catarrh* in cattle turned out on brushy pastures and which fill up the nasal chambers with broken twigs from the bushes, abundantly capable of absorbing, preserving and *"carrying"* the *virus*. *Thorns* and *thistles* imbedded in the lips or buccal mucosa must also be placed in the same list of possible absorbents and preservatives.

Not the least of these dangerous retainers of infection are the *degenerated tubercles*, not only those in the glands of the throat, but in a lesser degree, wherever they are within reach of the infection circulating in the blood and tissues.

If we follow along the alimentary canal, we are confronted with the *larvae of the Estrus bovis*, which in their younger stages live in the coats of the gullet or in its vicinity, where, as in their later habitat under the skin, they sometimes perish and leave dead matter beyond the circulation of their host and capable of preserving the virus for a time.

The whole *alimentary tract and its contents* become of necessity charged with the infection, and may indeed become one great series of culture flasks and media for its development. This is especially true of those cases in which the infection, taken in with the food, expends its force on the fourth stomach and intestines, and proves so fatal to its victim.

As a corollary of this the bowel dejections, wherever carried are infecting, and when *dried up on the hips, thighs, udder,* and elsewhere, may be *"carried"* far and transmitted widely.

I am afraid I have wearied you with this recital, but inasmuch as I began by emphasizing the fact that *foot-and-mouth disease* in

its uncomplicated form, is remarkably free from danger and mortality, it is necessary to boldly face the other aspect of the case, and give attention to the many conditions that may complicate a certain individual case and tend to even lethal results.

I must therefore add that there remain, to be considered, a large number of parasites which may become a means of carrying infection, of holding it in a virulent condition, of extending the period of potency, and thus of maintaining an outbreak. There are the tapeworms, which, in their cystic form, embedded in the tissues are always to be looked upon askance as fields of infection, the biting and blood-sucking parasite as opening a direct channel for both microbe and toxins into the tissues and circulation, without passing through any corrective action by the protective layer of epithelium cells, and the wandering embryos and adults in carrying germs into blood and tissues direct. Thus in dealing with each particular genus and age of animal, a full knowledge of each habitual parasite of that genus is essential in order that special precautions may be taken to cut short its existence even if that must be done by the sacrifice of its host.

(*To be continued*)

KERATITIS INFECTIOSA IN CATTLE (KERATITIS PYOBACILLOSA)[1]

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****[2]Schimmel states that rays of sunlight may play an important rôle in keratitis for the disease exists in the summer months, especially when the weather is dry and hot. Cattle that were in the shade of an orchard were exempt from the disease, notwithstanding the fact that they were milked by the same people who milked the other cows of the owner, which were infected with this eye disease. Schimmel observes that, it is very possible that the disease is originated by sunlight and maintained by infection. If

1. Tijdschrift voor Veeartsenijkunde, Vol. 38, 1911, p. 758.

2. References made to the opinions expressed by some earlier writers and not directly related to the work of Dr. Poels, have been omitted by the translators.

the sun can produce a solar eczema on the white spots of cattle, then one may also attribute to it the power to excite a keratitis.

This communication of Schimmel attracted my attention because one can hardly deny a predisposing agent to the pathogenesis of this eye inflammation, which in fact is caused by a microorganism.

Kattenwinkle describes a light form in which the cornea is only partly clouded and in which recovery occurs in 8 to 14 days without leaving a blemish. He describes a more severe form in which an infiltration occurs in the parenchyma of the cornea under the epithelium. This occurs in such amount that the central part of the cornea becomes yellow and spotted, bulging out conically so that it appears as if the yellow or yellowish gray infiltration were located on the cornea.

I make particular note of these communications because they throw a true light upon the correct observations of Kattenwinkel who has also observed with great accuracy the marked development of blood vessels on the periphery of the cornea.

The slight and severe forms are characteristic of this disease, besides, the process is always located entirely in the central part of the cornea and is at the beginning subepithelial.

The process develops in the central part of the cornea nearly opposite the pupil. Schimmel observed abscess formation and ulceration of the cornea only exceptionally and in the later stages of the disease. It appears that abscess formation is rare but I have observed an ulcer in the cornea.

In the beginning of the disease the infected eye shows marked lachrymation, photophobia and gumming of the eyelashes, especially of those of the upper lid. The path of the tears in a downward direction over the face is indicated by the gumming of the hairs. Besides, the whole eye is hot, painful and swollen. When the disease is discovered, conjunctivitis already exists, which may suggest that conjunctivitis is the primary lesion. This, however, is incorrect because the cornea is affected first and the conjunctivitis should be regarded as a subsequent development. A diffuse infiltration which is originally milky white, exists in the middle of the cornea. The diffuse corneal infiltration remains white in cases where the process rapidly subsides. In more severe cases, a more or less yellow color soon appears and the process is principally subepithelial. It soon spreads over the entire thickness of the cornea

thus developing a true keratitis parenchymatosa. In many cases adhesion of the cornea and iris occurs and in this case the fluid in the anterior chamber of the eye is practically all extruded and makes place for a mass of yellowish white, somewhat thick tissue. Casually observed, one gains the impression that it is pus, however, when incised, one finds instead of pus, a fairly solid tissue. In many cases the process remains limited to the central part of the cornea. In other cases it spreads over the entire cornea. In that case the animal is completely blind in the affected eye. Although I did not have occasion to determine if iridochoroiditis occurred in such severe cases it is very possible that this will be found to exist especially when suppuration occurs. However, I believe that too much importance is attached to suppuration in this keratitis, because in cases where I suspected the existence of hypopyon, as a matter of fact I found nothing else than solid tissue which occupied the cornea and the anterior chamber of the eye. In cases which I investigated, the involvment of the cornea was always most prominent so that I am convinced that in many cases the disease process remains limited to the cornea.

One case which I investigated showed an ulcer the size of a dime in the center of the cornea, which ulcer apparently occurred because the necrotic portion of the cornea at this point had disappeared. It may happen that the cornea becomes perforated in this manner and that a prolapsus of the iris occurs with adhesion of the iris to the diseased tissue of the cornea.

It is characteristic that in severe cases a marked formation of new blood vessels occurs at the periphery of the cornea beginning at the upper portion immediately adjoining the sclerotic coat. However, it also often happens in the course of the disease that the entire cornea is encircled peripherally with an intensely red colored fringe, which may reach 2 to 3 mm. in width. Often the cornea becomes somewhat conical shaped in the central part. This conical part is generally very rich in blood vessels on the surface and protrudes like a teat above the surface of the cornea so that it may be removed by an operation. Occasionally a staphyloma corneae is observed in the course of the disease, and in rare cases a shapeless mass of tissue (Caro luxurians) occurs. Generally one eye is affected but occasionally both.

Bacteriological Investigation. Immediately after I noticed the existence of this disease I made effort to ascertain its cause.

From the nature of the disease it appeared that it was improbable that the virus could be sought in the fluid which existed as a result of the hypersecretion of the eyelids, and which was found on the conjunctiva and medial canthus. Cultures made therefrom are absolutely worthless from an etiological standpoint. Therefore, the part of the cornea where the process occurred was incised and the infected tissue collected for bacteriological investigation with a sharp curet.

Five cattle which were affected in various degrees were operated upon and the diseased portion of the cornea was removed. The difficulty in this operation occurs in that the animal constantly turns the eyeball in the direction of the medial canthus with force so that it is completely hidden under the third eyelid. Therefore the eye was anesthetized by cocaine and a thread was inserted in the third eyelid in order to pull it outwards. Next, the cornea was split above the infected spot with a very sharp pointed scalpel. The diseased part, taken between tweezers, was clipped off with sharp scissors wholly or in part.

This operation does not hinder healing and I am of the opinion that the operation of removing the haw could justifiably be applied here in practice.

When one makes a bacteriological examination of the material thus obtained and uses the Gram stain, counter-stained with eosin, one obtains astonishing results. In preparations made in this way there are found myriads of small bacilli, which have all the characteristics of *B. pyogenes* which as is known is also the cause of udder pyobacillosis.

Besides, there were present two species of micrococci, one of which takes the Gram stain and the other does not. On the ground of the known pathogenicity of *B. pyogenes* I concluded that this microorganism is the specific cause and I considered the two species of micrococci as secondary infections.

However, the Gram-positive coccus occurred too constantly and in too great numbers to deny it all pathogenic qualities.

Because it is known that many microorganisms with very specific pathogenicity only grow on media in which there is present fluid blood serum of the same species in which the specific disease occurs, inoculations were made on cattle serum agar and on cattle blood agar exclusively. The diseased tissue of the cornea was smeared on this medium and placed in the incubator at 37°C.

After 36 to 48 hours incubation the cultures yielded important results. The coccus which already had been demonstrated microscopically had formed many and relatively large colonies and between these large colonies an enormous number of exceedingly small colonies had developed which in the beginning could only be seen with the hand lens. Upon investigation it appeared that the small colonies were those of *B. pyogenes.*

These small colonies not only develop in between the coccus colonies but also grow on and even in these, so that a symbiosis between these microorganisms could be observed in the culture.

There exists, therefore, in these microorganisms a symbiosis in the cornea *in vivo* and a symbiosis *in vitro.* The question arises: which of the two is the pathogenic agent? Therefore, *B. pyogenes* thus isolated was inoculated into an eye as was also the coccus. It was observed that the eyes that were inoculated with *B. pyogenes* demonstrated the typical picture of keratitis infectiosa, within a few days, while the eyes inoculated with the coccus showed practically no reaction.

The cattle which were inoculated with *B. pyogenes* demonstrated also in the further course of the disease the entire picture of the original keratitis infectiosa and even developed characteristically the red colored fringe of the periphery of the cornea.

It thus became evident that this cattle disease is caused by *B. pyogenes* which microorganism on account of its pathogenicity for cattle in general has attracted the attention of the veterinary profession in late years.

I wish to add that the infection of the cornea should be induced in a very peculiar manner. After the eye has been rendered insensible by cocaine a very small quantity of culture is injected underneath the epithelial layer of the cornea with an exceedingly fine and sharp hypodermic needle. Immediately after injection one may observe how far the liquid has dispersed in the epithelial layer by the grayish white spot resulting, because it has a different refractive power than the cornea. The point of the needle which is being used for this injection should previously be examined with a lens in order to ascertain that it is not bent back to the least degree.

The needle is inserted under the epithelial layer so that the oblique opening is entirely covered by epithelium because otherwise the liquid is deposited on the outside surface of the cornea and

I have not been able to produce the disease experimentally by putting drops of pyogenes cultures on the cornea.

Furthermore, I have injected cultures of pyogenes bacilli under the epithelial layer of the cornea of a sheep, and a horse, but practically no reaction occurred in these animals.

Finally, I inoculated a calf with a culture of *B. pyogenes* in the manner indicated. The culture in question originated from a case of udder pyobacillosis. This inoculation gave a positive result, thus demonstrating that *B. pyogenes* should be regarded as the cause of the infectious eye disease of cattle now existing in Holland. I do not wish to give any further details regarding the cocci that I found because I am still extensively engaged in studying these organisms to determine what importance they have as secondary invaders in this disease. That they are secondary invaders should be concluded because they are also present in the experimentally produced keratitis which resulted through injection of a pure culture of pyogenes bacilli.

I wish to add that these cocci do not grow at low temperatures but when cultures are kept at 22–24°C. the gelatin liquefies so slowly that I was originally of the opinion that the micrococci do not have the power of liquefying this culture medium.

Contagion by contact exclusive of predisposing influences apparently does not exits in keratitis. In slight cases which soon recover one can plainly demonstrate *B. pyogenes* microscopically. However, the organisms fail to grow because they have died through bacteriolysis. In these cases one is able to demonstrate the presence of the coccus not only microscopically but also culturally, for its powers of resistance do not seem to be slight.

I have used pyogenes serum as a prophylactic and as a curative agent with favorable results.

***1. The translators here omit a discussion by Dr. Poels regarding possible factors predisposing to the occurrence of Keratitis. He notes that keratitis infectiosa occurs in goats along with contagious agalactia and observes that some of the cattle affected with keratitis, have been affected with foot-and-mouth disease some time before. However, he doubts the importance of this last mentioned disease as a predisposing factor.

—Dr. O. W. Anderson has removed from Chicago, Ill., to Creighton, Neb.

—Dr. J. R. Severin, formerly stationed at Sioux City, Ia., is now with the Fort Dodge Serum Co., Fort Dodge, Ia.

TUBERCULIN TESTING*

Dr. A. T. Kinsley, Kansas City, Mo.

It was with reluctance that the writer accepted an invitation from the officials of this organization to prepare a paper on this subject, but after due consideration it appeared that, however old the subject of "tuberculin testing" may be, it is evident that application of the methods of control of tuberculosis is not producing the desired results, therefore a discussion of this topic may be appropriate. The writer will not attempt to consider all phases of tuberculin testing in detail because of the magnitude of the subject.

Tuberculin testing is the determination of the presence or absence of tuberculosis in animals by the application of tuberculin, and the following remarks will be confined to the tuberculin testing of cattle. Tuberculin, of which there are many varieties, is a biologic product containing disintegrated *B. tuberculosis* in their products. The methods of preparation of tuberculin are given in various text books and the dosage is indicated in the literature or upon the labels of tuberculin containers, therefore these problems will not be given any further consideration in this discussion.

In the study of infectious diseases it has been found that in different diseases special phenomena are manifested, as illustrating immunity or increased susceptibility. It is common knowledge that a hog that has passed through an attack of hog cholera is immune to that disease, and it is also common knowledge that an animal may be affected with tuberculosis for the greater portion of its life and as it advances in age become more susceptible to that disease. The scientific explanation of the persistent and increased susceptibility of the tissues of an animal to one type of infection and their resistance to other infections has not been determined.

A tubercular reaction is an indication of an increased susceptibility of the tissue of the reacting animal to the disintegrated bodies and products of the *B. tuberculosis*. This is an allergic reaction, and is the condition commonly known as serum sickness or anaphylaxis. A true tuberculin reaction, is specific and is indicative of tuberculosis in the reacting animal, although exceptions may occur.

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*Presented at the Annual Meeting of the Oklahoma State Veterinary Medical Association, May 3rd and 4th, 1917.

The response of a tubercular animal to tuberculin is threefold, consisting of a local, a focal and a general or systemic reaction. The local reaction occurs at the point of injection of the tuberculin and is the reaction evidenced in intradermal and ophthalmic tuberculin testing and is manifested by local hyperemia and inflammation. The focal reaction consists of a hyperemia with increased tissue action and occurs immediately around the tubercular centers, and may be responsible for the systemic disturbances which occur in the thermal or subcutaneous tuberculin test.

Three principal methods of applying tuberculin are available, viz: subcutaneous injection, topical application to the conjunctival mucous membrane and the injection into the skin. Upon this basis there are three types of tuberculin testing usually designated, as; first, subcutaneous or thermic; second, ophthalmic or ocular; and third, intradermic. Each of these will be briefly discussed.

The subcutaneous or thermic tuberculin test is the original method that was the outgrowth of Koch's attempt to treat tubercular patients by the injection of tuberculin. This test is made by obtaining three or more temperatures, of the animals to be tested, prior to the injection of tuberculin, and five or more temperatures after the injection of tuberculin. The pre-injection temperature should be obtained at about 2, 5 and 9 p. m., the tuberculin injected immediately after taking the 9 p. m. temperature, and the postinjection temperature should be taken at 6, 8, 10 a. m., 12 m. and 2 p. m. It is probable that more accurate results will be obtained if the length of time between the injection of tuberculin and the first postinjection temperature did not exceed six hours, and the temperatures taken every two hours until 18 hours after the injections of tuberculin. A reaction in the subcutaneous test consists of a systemic disturbance manifested by a rise of temperature in which the thermic variation makes a double curve. It is therefore apparent that it is essential to determine the normal temperatures of animals previous to the injection of the diagnostic dose of tuberculin and this is the reason for obtaining the preinjection temperatures. It is also equally essential to guard against conditions and environments that will tend to cause variations in the preinjection as well as in the postinjection temperatures.

This method of tuberculin testing is reliable if conditions

and environments causing variation in the temperature of the animals tested can be controlled, otherwise the findings will be inconstant. This test, if correctly and honestly applied, is adapted to those cattle that are accustomed to being confined, but is not adapted to the testing of range cattle or those that are not accustomed to confinement.

The ophthalmic or ocular tuberculin test consists of the application of a small quantity of purified tuberculin upon the conjunctival mucous membrane of one eye. An ophthalmic reaction consists of congestion and inflammation of the conjunctival mucous membrane. The congestion is usually evident within 12 hours after the application of tuberculin, and this is succeeded by an inflammation characterized by a muco-purulent or purulent exudate, which is sometimes so profuse that it will be observed as a discharge upon the skin beneath the inner canthus. This reaction is usually most intense about eighteen hours after the application of the tuberculin and persists for several hours thereafter. This test has not proven as accurate as the subcutaneous test. The ophthalmic test should not be applied when there is any disturbance of the ocular mucous membrane or upon animals in a pen or barn where dust is likely to be introduced into the eye.

The intradermal tuberculin test consists of the injection of a small quantity of tuberculin into the dermis. The usual site of injection selected is the caudal fold because of the pliability of the skin and easy access to this particular region. However, some investigators have made the injection in the skin of the lower eye lid and are claiming splendid results. An intradermic reaction is manifested by a local disturbance, resulting from the irritation of the sensitized tissues, and consists of a tumefaction of the cutaneous structures and special involvment of the related cutaneous lymphatics. The reaction becomes evident, in from 12 to 72 hours after injection, by a swelling varying in size from a large pea to a mass the size of a hen's egg. On close observation this swelling is found to be doughy, sometimes quite sensitive, and surrounding the line of introduction of the needle there will be a bluish area, this latter being particularly visible in white skinned animals. The swelling will persist for from five to fifteen days after injection and will then gradually subside. Sloughing frequently occurs, particularly of the area around the site of injection. An atypical reaction consists of a leathery thickening

of the caudal fold without any noticeable enlargement of any particular point. The magnitude of the reaction is probably an indication of the extent of the lesions. The small swelling appears to signify extensive infection and the large swelling small and probably recent infections, but thus far the exact relationship has not been positively established. As will readily be recognized, the intradermal tuberculin test has fewer objectionable features so far as the control of conditions are concerned than either the ophthalmic or thermic tests. It is equally applicable to range, dairy or show cattle; in the hot summer months and the cold winter months; in cows that have recently calved or are in the advanced stages of pregnancy; or during the oestral period.

The intradermal tuberculin test has received very careful consideration and study by Dr. D. F. Luckey, of Missouri, since 1908, during which time various phases of the technique of the test have been elucidated and perfected. Other states have done considerable experimenting with the intradermal tuberculin test, viz: California, Kansas, Texas, Oklahoma, Nebraska, South Dakota, Montana, Wyoming and Iowa, and some states are now accepting this test for interstate shipments. The accuracy of this test is largely dependent upon the correct technique of injection and interpretation of the reactions. The test from the scientific view point is much more accurate than the subcutaneous test, as the reaction of the intradermal method is local, whereas the reaction of the cutaneous is general or systemic.

Some maintain that the ophthalmic test is more reliable than either the thermic or intradermic. Those who have used the intradermal test intelligently and conscientiously, maintain that it has many advantages over both the thermic and ophthalmic tests.

Combinations of two of the methods of testing may, under certain circumstances, be of advantage. Dr. Luckey has reported that in tubercular herds he has obtained very satisfactory results by applying the ophthalmic tuberculin and giving the thermic test four days later. By this method the ophthalmic reaction is revived and intensified and in some instances tubercular animals react that do not respond to either test given separately. It is the judgment of the writer that all of the tests are of value and are quite reliable when properly applied under circumstances that favor best results for the test in question, and that condemnation

of one or the other test by certain officials is absurd and is evidence of a lack of a proper understanding of the subject in question.

The question of retesting frequently arises and unless great care is exercised, retesting causes much grief. It is the judgment of most men that a retest of typical reactors should not be given whether the test has been thermic, ophthalmic or intradermic. If a retest is permitted it should not be done for a period of sixty days or more after the primary test and most authorities agree that a retest should not be made in less than ninety days.

Considerable controversy has arisen as to the efficiency of the various tests and one writer, a member in a well known sanitary organization, stated last December that "The subcutaneous method has evidently been considered as the most accurate and has usually been accepted as the official test, the others being so far used for experiments only".

Tuberculin testing should be done carefully and with proper consideration of all factors that would in any way influence the outcome of the test in order that the findings may be dependable. Many test charts made by veterinarians are indicative of carelessness and in some instances bear evidence of dishonesty. It should be distinctly understood that tuberculin-testing cannot be successfully done by one who has not carefully studied every phase of testing.

In the annual report of the state veterinarian of Montana, it is shown that over ten percent of reactors were obtained in retests of some thirteen hundred cattle which had been brought into that state. Such findings are evidence of gross negligence or incompetency on the part of the individuals who have made the tests required for admission to the state. From the sanitarian's view point, tuberculin testing should be the most sacred duty of the veterinarian and those who have made improper charts or have been dishonest in their methods, should be prohibited from doing further testing, and it would not be too severe a punishment to revoke their licenses. Every test, regardless of the individual for whom such test is made, should be carried out in every detail. Unless radical changes are made in the testing done by the general practitioner, it seems probable that the future tuberculin testing will all be done under the direct supervision of government and state officials.

The primary object of tuberculin testings is to identify tubercular animals and is therefore a diagnostic method of solving the problem of control and ultimate eradication of tuberculosis in cattle, which, when accomplished, will simultaneously result in the eradication of swine tuberculosis and tend to diminish human tuberculosis.

SUMMARY OF OBSERVATIONS ON 1470 HOGS, HYPERIMMUNE TO HOG CHOLERA*

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The data and observations alluded to in this paper were made upon a large number of pigs used for the production of anti-hog cholera serum (Dorset-McBride-Niles method) at the Minnesota State Serum Plant. They cover a period of approximately thirty-seven months, from December 1913 to December 1916, inclusive. Since the production of anti-hog cholera serum must necessarily follow the production of hog cholera virus, the author thought it advisable to report these findings as a sequel to those presented by his predecessor.[1]

In nearly all instances, pigs used for the production of serum were obtained from the stockyards at South St. Paul. They weighed on an average 87 pounds per head when purchased. They were received at the plant, carefully weighed, tagged, and described, and then immunized against cholera by the serum-virus method (simultaneous vaccination). After keeping them in quarantine pens for at least twenty-one days, during which time they were watched and the results of vaccination recorded, they were transferred to a feeding farm and kept until they were more fully grown. By this method of procedure a rather complete history of each animal was known, when it was presented for hyperimmunization. These principles were deviated from in only a few instances and then the animals were personally selected when procured.

*Published with the approval of the Director, as paper No. 64, Journal Series of the Minnesota Agricultural Experiment Station.

1 HOSKINS. Observations on 2800 pigs Inoculated with Hog Cholera Virus. *Jour. A. V. M. A.*, September 1916.

The actual number of animals operated on was 1470, but the statistical figures mentioned cover the number of times they were used during the operations.

The average weight per hog at the time of hyperimmunization was 267.14 pounds, although there was a total of 218 or 14.83% of the pigs that weighed 150 pounds and less, the lightest pig used for hypering weighing 113 pounds. It was not the intention to use such small animals as a regular procedure, but it often became necessary to inject one of proper size to utilize the remainder of a quantity of virus.

For the hyperimmunization of these hogs there were required 2,218,700 mils of virus (defibrinated virulent blood from pigs sick with hog cholera), an average of 1509.32 mils administered per hog, or an average of 6.18 mils administered per pound body weight. During the first half of the period covered by this report, two methods of preparing hyperimmunes were used; which were designated as the "slow intravenous" and the "intravenous" methods respectively. In the "slow intravenous" method there was an interval of from four to eight days between the first and second injection of the necessary dose of virus to affect a condition of hyperimmunity. This method was practiced on hogs that weighed 270 pounds and over, and required four to five mils of virus per pound body weight at each injection. The "intravenous" method is much more satisfactory, because the injection of the necessary dose of virus is done at one operation, the virus being injected into the posterior auricular vein under a pressure of from three to six pounds per square inch, and the amount of virus used is much less than with the other method. This latter method has been used exclusively for the past two years and often times a hog which had been hypered by the slow intravenous method at the initial hypering would be hypered by the intravenous method on subsequent rehyperings. By the initial hypering is meant that time when the animal receives its first large dose of virulent material intended to stimulate the production of an excess of immune substances.

One hundred and twenty-nine hogs were hypered by the slow intravenous method at their initial hypering, and only eight injected by this method at the time of their first rehypering, and two at the second rehypering, as compared to 1331 hyperings by the intravenous method.

During the first half of this period it was the regular proced-

ure at this plant to rehyperimmunize all hogs whose tails were long enough to permit of another one, two, or as many more tail bleedings as could possibly be obtained. 23.99% of the hogs were hyperimmunized once after a first series of three tail bleedings, and 8.63% rehypered again after another series of tail bleedings. It is of interest to note here that one individual of the latter group, a hog of 242 pounds, produced 14,372 mils of serum (defibrinated whole blood).

In the process of serum production, the length of time that should elapse between the time of hyperimmunization and the first operation to obtain blood (serum) whether it be by tail bleeding or carotid bleeding (killing), has been an open question among some producers of anti-hog cholera serum. At the State Serum Plant, sufficient time has always been allowed for the production of immune substances in the hyperimmunes, 13.06 days being the average length of time between these two phases of the process. The lapse of time between the first and second tail bleedings averages 7.25 days, 11 days between the second and third tail bleedings and 8.76 days between the time of the last tail bleeding and the carotid or final bleeding (killing).

There were 1587 first tail bleedings, at an average weight per individual of 209.85 pounds, and these produced an average of 1026.06 mils of serum per individual, or an average of 4.88 mils per pound body weight. From a total of 1466 hogs weighing 201.56 pounds per hog, at second tail bleeding, there were obtained 1120.76 mils per individual, an average of 5.36 mils per pound body weight. The total number of third tail bleedings is comparatively small, there being only 429, which weighed an average of 201.35 pounds per animal, bleeding 1045.94 mils each or an average of 5.18 mils per pound body weight. There was a total of 1292 hogs killed or carotid bled, which equals 87.89% of the total number hyperimmunized. These averaged per head 209.34 pounds and obtained 2460.46 mils per individual or an average of 11.75 mils of serum per pound body weight.

As a grand total number of mils of serum produced from these 1470 hogs that were hyperimmunized, we have 6,499,011 mils which makes an average per hog of 4421.09 mils.

During the period referred to there were occasional mishaps among the hogs at various stages of the process, a total of 126 being lost by death, 54.76% of which died between the time of hy-

pering and tail bleeding. A number of them died during or soon after hyperimmunization. These would usually begin their struggle before 300 mils of blood had been injected. The first indication that was apparent was the rolling of the eye-ball and rapid successive smacking or chopping of the lips, followed by the animal stiffening and relaxing with the intervals between these phenomena decreasing and then increasing again.

This phenomenon, shock, varied in its degree of intensity. In some cases it was so severe from the onset, that death resulted while the animal was still in the restraining crate; while others, after great effort to arouse them, would rise to their feet and in a weakened condition would stagger, topple over again, and often regurgitate. Some animals would live for from a few hours to twenty-four or more, without regaining vigor or consciousness apparently. The writer has checked many of these serious consequences by shutting off the influx of blood immediately at the beginning of the struggles by the patient, then carefully allowing only a small amount of blood to pass into the vein at intervals, until the animal showed signs of normal breathing and is sensitive to corneal irritation, whereupon pressure could be increased and the injection be continued as before.

Deaths not caused by the operation were attributed to such conditions as; air embolism, heat stroke, paralysis, fractures, pyemia, septicemia, cachexia, and other diseases of the respiratory, digestive, and circulatory systems.

The writer is indebted to Drs. H. P. Hoskins and J. T. E. Dinwoodie with whom he has been associated during the greater part of the time covered by this report, for their part in the recording of observations and statistics; and to Mr. R. E. Harlan, who assisted in the mortuary and operating laboratories.

—Dr. Mason, who has been in charge of the veterinary portion of the Remount Depot at El Paso, Texas, has been ordered to the Remount Depot at Fort Reno, Okla. It is rumored that Dr. Grutzman is to be Dr. Mason's successor at El Paso.

—A newspaper statement that twenty-six deaths in two days from anthrax at Honolulu brought a report from Territorial Veterinarian Norgaard that the herd undoubtedly had been inoculated deliberately.

THE LIFE HISTORY OF HYPODERMA BOVIS AND H. LINEATUM*

SEYMOUR HADWEN, D.V.Sc., Agassiz, B. C.

The notes which follow are based on observations made at Agassiz, British Columbia. The most important gap which remains to be filled in the life history of these two flies, is to discover the larva soon after it has bored through the skin and to trace its path to the gullet. Further observations are also required to sharply separate its various stages; unfortunately the species overlap. A number of the experiments relating to the migration of the larvae from the gullet to the back, and on the anaphylactic reactions which were made in collaboration with E. A. Bruce. It is not my intention to review all the work which has been done, except to mention the pioneer work of Bracy Clark, and of the later experiments like Brauer, Hiurichsen, Koorevaar, Curtice, Schaupp, (quoted by Riley) Carpenter, Hewitt and Glaser. It is pleasing to note that, headed by Bracy Clark, most of these men were veterinary surgeons.

THE PRINCIPAL DIFFERENCES BETWEEN THE TWO FLIES:

	Hypoderma bovis	*Hypoderma lineatum*
1.	Length 14 mm. Distance between eyes just in front of ocelli 1.9 mm., greatest diameter of eye 1.9 mm.	Length 12.7 mm. Distance between eyes just in front of ocelli 1.9 mm. greatest diameter of eye 1.6 mm.
2.	Yellow hair on anterior part of thorax.	Anterior part of thorax black and shining.
3.	Wing veins dark brown.	Wing veins nearly black.
4.	Alulae have a reddish brown border.	Alulae are uniformly white.
5.	Under part of abdomen and thorax nearly black.	Under part of abdomen and thorax lighter.
6.	Legs clean with few hairs.	Legs rough and hairy.
7.	Coloring of tail end orange yellow.	Coloring of tail end reddish orange.

METHODS OF OVIPOSITION.

1.	Lays in sunshine.	Lays principally in the shade of the animals.
2.	Causes cattle to "gad" both old and young.	Causes less annoyance, but chiefly in young animals.
3.	Lays its eggs principally when the animals are running.	Lays its eggs mostly when the animals are recumbent.

*Presented in part before the Entomological Society of America in New York, December 1916.

4. The eggs are laid mostly on the out side of the hind quarters and on the legs above the fetlocks.	The eggs are laid on all parts which the fly can reach when resting on the ground, while the animals are lying down. Even when the animals are standing the fly is able to lay eggs on those hairs which are close to the ground, namely on the heels.
5. The fly is a clumsy insect and strikes at the animals blunderingly.	The fly is much more gentle and deliberate in its movements.
6. The eggs are laid singly at the roots of the hairs and are rarely visible without lifting the hairs.	Several eggs are attached to a single hair and are often visible without lifting the hair.

Hatching of Eggs—Both species take about the same time to hatch—4 to 7 days. They will hatch with or without moisture on or off the animals at room temperature. In both cases the egg splits open at the top to allow the emergence of the larva.

Penetration of the Larva—This is a comparatively slow process taking several hours. The larva crawls down the hair and enters a follicle. In the case of *H. lineatum* it is probable that several larvae enter the same opening.

Skin Lesions.

Hypodermal rash. An irregular scattering of round raised lumps, especially on the outside of the hind quarters, appearing suddenly. Anaphylactic in nature and rarely tending to suppurate. Very little exudation of serum.	Hypodermal rash. Diffuse irregular swellings, very irritable, appearing suddenly. Anaphylactic in nature, often large and ending in the production of pus and a marked dermatitis. The lesions follow the parts of the animal which come in contact with the ground. i. e., legs, flanks and sternum. A large quantity of exudate matting the hairs.

It is a recognized fact that young animals are more heavily parasitized by Warble-flies than old ones. It is likewise noticeable that the older animals exhibit marked skin lesions, whereas young animals show but little evidence of the larval penetration. Evidently the older animals resist the larvae as they are penetrating the hide. These phenomena can be explained in the following way: The swellings are largely anaphylactic in character, seeing that they appear so suddenly, are very itchy, are edematous in nature and contain numerous eosinophilic leucocytes. It is worth noting that by the time the larvae reach the oesophagus they are

sterile, having evidently by this time disposed of any bacteria they may have carried through the skin. These edematous swellings are bacteria free but are crowded with eosinophiles, whereas the dermal swellings are frequently contaminated. This disposes of the principal visible points differentiating the two flies. There now remains to give a summary of the life history of these flies.

SUMMARY—*Hypoderma lineatum* lays its eggs as early as April 15th, but the usual laying period is during the month of May. At Agassiz they have never been captured later than May 30th. *Hypoderma bovis* begins in the early part of June and continues up to the beginning of August. Between the last appearances of *H. lineatum* and the first of *H. bovis* there is usually a period of ten days when the cattle are immune from attack of either species. *H. bovis* frightens cattle much more than *H. lineatum.* The eggs take about a week to hatch; the larvae bore through the skin in the coarser porous parts, taking several hours in the process; at this stage they are rather less than 1 mm. long. The lesions resulting from this penetration are caused partly by bacterial invasion and partly by anaphylactic reactions; those produced by *H. lineatum* being more severe. For the skin lesions I have proposed the name of *hypodermal rash.* At this point there is a hiatus in the life history as it is not positively known how the larvae reach the esophagus, where they are subsequently found; most likely they travel in the loose connective tissues under the skin up to the region of the throat and into the esophagus where the muscles bifurcate. Passing down the esophagus they follow the submucosa and are almost always found lying along the long axis of the canal. Whilst in the esophagus small edematous swellings are found surrounding the grubs, these are sterile and are anaphylactic in character, the exudate contains large numbers of eosinophilic leucocytes but no pus cells. The earliest record made at Agassiz was on August 15th, when a larva 3.4mm. was found and several slightly larger. According to Carpenter continental observers have found them smaller than this. *H. lineatum* makes its appearance in the backs of cattle about December 15th and *H. bovis* about a month later. The larvae at this time have grown to about 1.5cm. and are of the same size in the neural canal and under the skin which they have just reached. At this stage it is difficult to separate the larvae of the two species, but Mr. F. C. Bishopp has, I believe, discovered good distinguishing marks be-

tween the species. The life histories overlap at this period making it difficult to follow the migration, but in the latter part of the season (the middle of March) the last larvae to leave the gullet are at the paunch end. They pass out under the pleura and go to the neural canal either up the crura of the diaphragm or up the posterior border of the ribs entering the canal by the posterior foramen, from there they descend the canal under the dura mater, emerge again through the foramen and reach the back, forming the characteristic swellings commonly called warbles. The larvae follow connective tissue exclusively and no larvae have been discovered in muscular tissue. The mature larvae leave the animals' backs from the early part of the year up to the first days of July. The periods for the two species have not been fully worked out; but judging from what records we have of the pupal period and the time of year the flies are about, *H. lineatum* begins to emerge in February and finishes about May 1st. *H. bovis* begins about May 1st and ends approximately on July 1st. The average pupal period for *H. bovis* is 32.5 days and for *H. lineatum* a little less. The duration of the life of the flies is short seeing that they cannot feed. This life history applies to Agassiz, British Columbia; doubtless in other countries variations will be noticed, but the period spent by the larvae within the host must be of the same duration, seeing that animals' temperatures are the same the world over.

I am indebted to Dr. F. Torrance, Veterinary Director General, Canada, for leave to publish this paper.

THE NEW PHARMACOPEIA*

H. J. MILKS, Ithaca, N. Y.

The United States Pharmacopeia is a book of standards, established by law, to which drugs and their preparations must conform. The first pharmacopeia of the United States was published in 1820 and it is revised every ten years by a committee of physicians and pharmacists. The preparations made according to it are *official*. The present 9th Decennial Revision appeared in August and became official in September, 1916.

*Presented at the Conference of Veterinarians, Ithaca, N. Y.

The pharmacopeia gives first the Latin title of the drug, followed by the English name, official abbreviation and synonyms. A short concise definition of the drug is given. This is followed by the characteristics and tests by which the purity and identity of a drug may be recognized and finally in what (human) doses it may be administered. Since it is intended as a short concise work of reference, it does not include all the material used in medicine nor does it go into detail concerning the one discussed.

This was the only official standard of drugs used up to June 30, 1906, when Congress passed the National Food and Drug Act. This act was soon followed by similar legislation in most of the states. These laws specify the United States Pharmacopeia and the National Formulary as the standards for drugs. The following is an extract from the National Law: "The term 'drug' as used in this Act, shall include all medicines and preparations recognized in the United States Pharmacopeia or National Formulary for internal or external use, and any substance or mixture of substances intended to be used for the cure, mitigation or prevention of disease of man or other animal." The standard of purity and strength, as given in the pharmacopeia is intended solely to apply to substances which are used in medicine or in determining the identity or purity of such substances.

The present 9th. pharmacopeia is very similar to the preceding yet many changes have been made in it. It is not the purpose of this paper to mention all those changes but only those of considerable importance to veterinarians.

Solubility. The reading of the solubitity of drugs has been changed from soluble in —— parts of water to 1 gram dissolved in —— mils of water. This has changed the solubility or apparent solubility to some extent. Thus iodine is soluble in 5000 parts of water or 1 gram of iodine dissolves in 2950 mils of water.

Purity. The purity rubric instead of reading a certain per cent. or not less than a certain percent. in many cases reads not less than —— nor more than. This change is made to meet reasonable requirements particularly in preparations of drugs and permits a slight variation either above or below the ideal.

Abbreviations. Abbreviations are given in order to have some official abbreviations for the convenience of prescribers and shop keepers.

One of the first and most important changes for veterinarians

is from c.c. cubic centimeters to mils. The word mil has superseded the term c.c. The reason for this was that the United States Bureau of Standards declared the cubic centimeter as a misnomer, as it evidently meant the thousandth part of a liter. (1 liter equals 1000.027 cubic centimeters). The term mil is derived from the first three letters of milliliter which it means. It is written with a small m and is not followed by a period. There is practically no difference between what was regarded as a c.c. so that it is simply necessary to remember the change in name.

ARTICLES ADDED. Some of the more important substances added are:—

Aqua Destillata Sterilizata	Sterile Distilled Water
Beta Eucain Hydrochloridum	Beta Eucain hydrochloride
Bismuthi Betanaphtholas	Beta Naphthol Bismuth
Caffeinae Sodio-Benzoas	Sodio benzoate of Caffein
Creosoti Carbonas	Creosote Carbonate
Diacetylmorphina	Heroin
Emetine Hydrochloridum	Emetine hydrochloride
Hypophysis Sicca	Dried Pituitary body
Liquor Hyphophysis	Solution of Pituitary body
Liquor Sodii Chloridi Physiologicus	Physiologic salt solution
Magma Bismuthi	Milk of bismuth
Oleum Sesame	Oil of sesame
Oxygenium	Oxygen
Paraformaldehydum	Paraform
Phenolphthaleinum	Phenolphthalein
Potassa Sulphurata	Liver of sulphur
Quininae et ureae Hydrochloride	Quinine and urea hydrochloride
Serum Antitetanicum	Tetanus antitoxin
Sodii Cacodylas	Sodium Cacodylate

ARTICLES DROPPED:—

Argenti Nitras Mitigatus	Mitigated silver nitrate
Cataplasma Kaolini	Calaplasm of kaolin
Coca	Coca
Collodium Stypticum	Styptic collodion
Exilirum Ferri, quininae et Strychninae Phosphitum	Elixir of iron quinine and strychnine phosphite
Emulsion Olei Morrhuae cum hypophosphitibus	Emulsion of cod liver oil with hypophosphites

Eight Extracts including those of aloes, and digitalis.

Thirty-eight Fluidextracts including those of Capsicum, Cocae, Phytolacca, Pruni Virgiana, Quassia, Stramonium, Mistura Rhei et Sodae. All the alkaloidal oleates. Physostigmine Sulphas, Plumbi Iodium, Sulphuris Iodium.

Five Spirits including: Aetheris Compositum, Ammoniae Compositum, Frumenti, Vini Gallici.
Ten Tinctures including: Aloes and myrrh. Ipecacuanhae et Opii.
Four Ointments including: Ung. Hydrargyri Oxidum Rubri, Ung. Potassii Iodidi. All the wines.

Changes in Official Names

The following changes in the official Latin names were made:

Cannabis Indica	to Cannabis
Aqua Hydrogenii Dioxidi	to Liquor Hydrogenii Dioxidi
Rhamnus Purshiana	to Cascara Sagrada
Hysocinae Hydrobromidum	to Scapolominae Hydrobromidum
Alcohol Absolutum	to Alcohol Dehydratum
Oleum Betuli and Gaultheria	to Methyl Salicylas
Veratrum	to Veratrum Viridum
Oleum Lavandri Flores	to Oleum Lavandri

Changes in strengths of preparations: In general the strengths of the preparations remain about the same as in the 8th revision. All potent tinctures are still ten per cent and fluidextracts 100 per cent of the drug. Some of the standards for the alkaloidal drugs are apparently higher than before. This is because the assay calls for total ether soluble alkaloids instead of one alkaloid. For instance in the 8th revision, nux vomica was supposed to assay at least 1.25 per cent of strychnine, and in the new pharmacopeia it reads not less than 2.5 per cent of ether soluble alkaloids, which includes brucine as well as strychnine. Since brucine is present in almost the same proportion as strychnine there is little difference in the requirements. The dose has not been changed in the pharmacopeia.

Several drugs are recommended or required to be assayed. Among the former are preparations of digitalis and the latter preparations of cannabis.

Cantharis (cantharidis) is required to contain not less than 0.6% of cantharidin. This will insure the veterinarian of getting a good preparation instead of some of the poorer beetles.

Among the other changes are chapters on sterilization, diagnostic reagents and on biological assay.

—Another case of anthrax was reported the last of May in a longshoreman at New York City. He had been handling raw hides and is believed to have caught the disease in that way.

THE ETHICS OF THE PROFESSION OF VETERINARY MEDICINE*

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To determine the proper attitude of man towards his creator forms the field for religious science. To determine his proper relations with his fellow men is the object of ethics.

Until men had made sufficient advancement in social grouping to begin to realize a conflict of interests there could not have arisen in their minds the question of what they ought or ought not to do with regard to those about them.

When, however, in their struggle for food or shelter, in their efforts to satisfy any desire, they found others endeavoring to secure the same things for which they themselves were striving there would of necessity arise the question of what they ought to do.

Whenever that question of ought, the question of what is right conduct between men is raised, men find themselves in the field of ethics.

In one sense what is right between men in general is right for a professional man whatever his profession. That is to say ,there is no special ethics of a profession. From another point of view every walk in life, inasmuch as it establishes different sets of relations between those who follow it and those with whom they come in contact, has its own peculiar ethical code.

From this view point we may justly speak of ethics of the medical profession.

From the standpoint of philosophy it may be said that the whole code of ethics is embraced in the rule of the conduct announced by Buddha, adopted by the Chinese teacher and repeated by the Christ—to do unto men as we would that they should do unto us.

But the abstract principle will not serve for the guidance of men in masses. There must be the statement of the law in concrete cases; hence men are constantly asking "what should be my conduct in this or that situation?"

To arrive at a fair answer to such question we should endeavor

*Read before the Colorado Veterinary Medical Association, Jan. 25, 1917.

to discover the origin of ethical laws. Why or how have men come to look upon one course of conduct under certain circumstances as right and the opposite conduct as wrong? Why do we, the descendants of ancestors who saw no impropriety in going entirely unclothed, accept as an ethical principle the demand that all men shall be fully clothed?

There seem to be two lines of thought, each of which has been accepted as leading to the correct answer to our question. One group of thinkers reason that in his development from barbarism to his present stage of civilization man has made many experiments in many fields. That those courses of conduct which have proved to be inimical to man's efforts to satisfy his ever increasing wants have been avoided, while other courses having been of assistance have been retained and insisted upon as right. When men, having dropped their roving, pastoral habits, settled down to a more or less crude form of agriculture and began to look upon the field in which a man had placed the seed and which he had protected from the destructive attacks of savage beasts and lawless men until the harvest was ready, as in some way being that man's private property, it would soon become manifest that the sense of ownership aroused an ambition to improve, to beautify and to remain upon the land. These are all social virtues which have contributed much to the progress of society and have, therefore, come to be looked upon as right.

The other group of thinkers prefer to look upon man as a creature of habit and to say that whatever men persist in doing until the habit of doing it has been formed they will continue to do and will finally come to consider the doing of it right and the omission of it wrong.

They point to the many actions, which, while they are made the subject of ethical rules cannot be said to be either advantageous to society or the reverse.

Whichever of these views we may choose to accept we will find it difficult to deny that that course of conduct which has come to be considered right between man and man is conducive of good results in that it serves as the lubricant to prevent friction in society.

One who enters upon the practice of a profession has a five-fold duty; he has his duty to himself, his duty to his profession, to his professional brethren, to those who employ him, and to

society at large. To himself he owes it that his conduct be such as to command the respect of all men. That he be recognized as one who has drunk at the fountain whence flows streams of pure wisdom.

To his profession is due that dignified attitude which will show that he harbors no thought that it requires an apology for having entered upon it.

The practice of veterinary medicine was for so many years given over to the blacksmith and the stable boy that people now find it difficult to believe that it has become an art requiring for its successful practice as thorough and careful preparation as that given to the practitioner whose efforts are directed to the healing of diseases to which humanity is heir.

Law, medicine and theology have long been known as the learned professions and the men who have practiced them have for centuries ranked among the leaders of thought and the patterns of right conduct in society. When the student of veterinary science essays to enter into companionship with such men on the footing of full intellectual equality he owes it to them and to himself to make himself worthy of that companionship. Any crudeness of manners, any lingering rudeness of the old-time "horse-doctor", any failure by his conduct to claim full recognition belonging to a polished and learned gentleman must result in his being looked upon as of less worth than the members of the well-established professions.

As to the duties of the veterinarian to others, from the standpoint of ethics, they differ in no way from those of the physician who gives his attention to the ills of humanity. I have found the ethical principles which have come to be recognized as binding upon members of the medical profession so well expressed by others that I take the liberty to make rather large quotations from their writings.

"It is perfectly ethical to advertise by giving your cards to those who employ you and to others who may at some future time need your services, but it is considered unprofessional to state where you graduated and how long you have practiced, either upon your cards or in the newspapers."

When you are the first to reach a case in which the excitement of alarm for the safety of the patient a number of doctors have been summoned, with no special choice among them, you

should promptly send a trusty messenger to cancel the call of the others and thus save them the unnecessary visit.

A decent respect for the opinion of the world should lead you to keep within the limits of good taste in everything, and to practice all that constitutes politeness in dress and deportment.

Signs and cards reading "practice limited to certain fields of practice" are perfectly ethical; but those that read, "special attention given to certain forms of disease" are not.

While it is perfectly just and proper to seek reputation by all legitimate means, and to embrace every fair opportunity to make known your attainments, all low intriguing and sensational scheming to obtain practice is unethical.

You should determine that in all your efforts you will play the man, from your diploma to your deathbed; that you will begin well, continue well, and end well; and will do nothing that is criminal, nothing that will not stand the strongest sunlight and the severest scrutiny; nothing for which you would hesitate to sue for your fee; and, if necessary, to stand up before a judge and jury to claim it; nothing, in fact, that you cannot approve of with your hand on your heart.

Nothing is more highly unethical than the exhibition of unprofessional tricks. The practice of medicine is an honorable calling and every person who enters upon it should resolve that it shall not be looked upon as in any way less honorable because he has adopted it.

Honor and duty require you to do right not only because it is good policy, but because of the higher reason that it *is* right.

Like every other physician, you will have friends to favor and extol you, and both secret and open enemies to oppose and decry you, and, although you can neither stop the tongues of the latter nor prevent their unfavorable criticism, still you should be careful that nothing be permitted to blast your reputation for upright, honorable conduct. Charges against your skill, unless very grave and damaging, had better be left unnoticed, or passed over with indifference.

One of the most unethical things that a practicing physician can be guilty of is to boast of the number of cases he has on hand or of the wonderful success that has attended his efforts.

The United States seems to be the only country in which there exists a written code of ethics for the medical profession.

It may be that other countries from long custom are able to dispense with them. But in this land where all social customs are still in the formative stage the very nature of society and the jarring of interests require that physicians shall have some general system of written ethics to define their duties, and, in case of doubt, to regulate their conduct toward each other and the public in their intercourse and competition.

Every individual in the profession is, of course, supposed to be a gentleman, actuated by a lofty professional spirit, striving to do right and to avoid wrong, and, even were there no written rules at all, the vast majority would conform to the rules of justice and honor.

The non-existence of a code would make it possible for unscrupulous practitioners to pounce upon the patients of well-bred physicians like hungry wolves, and to carry on a regular system of infringement, self-advertising, certificate giving, and wrongdoing in general, regardless of their rights, while those aggrieved would have no visible standard of appeal.

In view of these facts there has been adopted a code of ethics in this country which is recognized as binding upon every physician who is qualified and admitted to the practice of medicine.

While the provisions of this code have especially in view the conduct of those who treat the human patient, its declarations are so obviously founded upon principles of right and justice that it should with a few modifications, be adopted by the profession of veterinary medicine.

"Professional morals are an important part of medical education, and it is as necessary for every school of veterinary science in America to give to each alumnus a copy of the written moral code of his profession as it is to confer upon him his doctorial degree."

Good morals require that when called upon to attend a case which has been previously under the care of another physician, especially if the owner of the sick animal is dissatisfied with his treatment, or if the case is likely to prove fatal, that you be carefully just. Do not disparage the previous attendant by saying it is too late, and expressing a wish that you had been called in sooner, or criticise his conduct or his remedies.

Seek to enhance your profession in public esteem at every fitting opportunity, and also to defend your brethren and your profession when either is unjustly assailed.

There are a thousand unwritten ways to show an ethical spirit and a thousand undefinable ways to evince an unethical one.

Medical quarrels are a disgrace to the profession. Do not captiously follow up every trifling infringement, difficulty, or apparent contradiction, as if you courted a war with everybody for what you may be pleased to call your rights.

"With professional honesty for your pilot, be firm in your determination to steer clear of all practices and alliances in which your part would not bear legal scrutiny or detailing in the community; and you will not only safely pass the rocks of shame and the whirlpool of bitterness which have wrecked so many of your profession, but you will have that highest of all rewards—the approval of your own conscience.

Every science has its difficulties. Even in mathematics there is no such thing as a perfectly straight line, or exact sphere, or perfectly plane surface. The science of the law, or at least the practice of the science, seems to be based upon the uncertainties by which it is befogged. Religion has its numerous creeds and opposing systems of belief. What wonder, then, since it is a human institution, that there are differences of opinion in medicine?

"The truth is, however, that physicians personally are far more imperfect than physics."

In closing, I think I can do no better than to read the oath of the physician, said to have been formulated by the father of medicine nearly two thousand years ago. It reads as follows:

"I swear by Apollo the physician, and Aesculapius and Health and All-heal, all the gods and goddesses, that, according to my ability and judgment, I will keep this oath and this stipulation to reckon him who taught me this art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required, to look upon his offspring in the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation, and that by precept, lecture and every other mode of instruction, I will impart a knowledge of the art to my own son, and those of my teachers and to disciples bound by a stipulation and oath according to the law of medicine, but to none others.

"I will follow the system of regimen which according to my ability and judgment I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous.

"I will give no deadly medicine to any one if asked, nor suggest any such council, and in like manner I will not give to a woman a pessary to produce abortion.

"With purity and with holiness I will pass my life and practice to my art. I will not cut a person who is suffering from a stone but will leave this to be done by men who are practitioners of this work.

"Into whatever houses I enter, I will go into them for the benefit of the sick. I will abstain from every voluntary act of mischief and corruption; and, further, from the seduction of females or males, of freemen and slaves.

"Whatever in connection with my professional practice, or not in connection with it, I see or hear, in the life of men, which ought not to be spoken abroad, I will not divulge, as reckoning that all such should be kept secret.

"While I continue to keep this oath unviolated, may it be granted to me to enjoy life and the practice of the art respected by all men in all times! But should I trespass and violate this oath, may the reverse be my lot!"

CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."

NEW TREATMENT FOR WOUNDS AND BURNS.*

H. C. Campbell, V.M.D., University of Pennsylvania
Philadelphia, Pa.

While associated with the H. K. Mulford Co., of Glenolden, Pa., as veterinarian from 1903 to 1908, I became interested in a dusting powder for the treatment of wounds, recommended by J. J. Kinyoun, Director of the Biological Laboratories. This powder consisted of dried or evaporated tetanus serum of a low value, mixed with 5% to 10% thymol iodide (aristol). I used this powder on a number of occasions on minor wounds which occurred

*Presented at the meeting of the Keystone Veterinary Medical Association, May 8, 1917.

from time to time among the attendants and also upon animals. The rapidity with which the wounds healed led me to believe that this powder had more virtue than the ordinary pharmaceutical dusting powders.

Since this powder contained tetanus antitoxin, a few experiments were conducted to determine whether or not it would prevent tetanus along with its healing properties. Deep scarifications were made upon a number of guinea-pigs. Tetanus organisms were planted upon the wounds and one-half received the dusting powder while the other half remained as controls. In all pigs in which the powder was used upon the wounds they healed rapidly and developed no tetanus. In the other half, the wounds sloughed and the pigs developed tetanus.

Being impressed with the rapidity with which all the wounds healed when this powder was used, I thought that the serum might have some virtue as a wound healer. Later, while associated with the Veterinary Department, University of Pennsylvania, I concluded to try normal serum mixed with thymol iodide (aristol) as a remedy for healing wounds. I prepared a preparation and gave it to several practitioners who reported that it gave good results, but objected to its being in the form of a liquid. Their reason being that a sufficient quantity would not adhere to the surface of the wound. We then tried to incorporate the serum in some substitute which would assume the consistency of a salve. For this purpose tragacanth was used and then mixed with linseed oil, lime water and petrolatum.

The following formula was adopted:

Thymol Iodide	drams	4
Serum	ounces	5
Linseed Oil	ounces	2½
Lime water	ounces	2½
Tragacanth	grains	120
Petrolatum	ounces	2

Add serum to the tragacanth and allow to stand 24 hours. Dissolve the thymol iodide in the linseed oil and make an emulsion with the lime water, then mix the emulsion with the serum and tragacanth and lastly add the petrolatum and mix thoroughly.

After incorporating the serum and thymol iodide with the tragacanth, linseed oil, lime water and petrolatum, it occurred to me that the mixture might be beneficial for burns. Burns were

treated on a number of occasions with very good results. The following is a brief history of one case:

A man about forty years old had both hands badly burned while trying to extinguish a fire in his barn in 1914. The patient was immediately taken to the hospital and the usual saline treatment applied. About the third or fourth day I asked permission to treat one hand with the above preparation. Both hands were in about the same condition. The man claimed to get immediate relief in the hand on which this salve was applied. The wound healed more rapidly and left scarcely any scar tissue as compared with the other hand. Using the patient's own words, he said: "I never had such relief. If I ever have to be treated again for burns, this salve is what I want, regardless of price."

Since that time the salve has been used on a number of burns with good results. Dr. E. T. Booth and Dr. Wm. H. Ivens, two veterinary practitioners in the city of Philadelphia have both used the salve on a number of wounds and burns and report excellent results. Dr. Booth reports a case of a horse having bed sores with ragged undermined edges in which he used this salve. He states that he never had any other preparation prove more satisfactory on wounds of this character.

It has been my belief for some years that blood serum aided in the healing of wounds.

Now that wounds and burns are so prevalent among soldiers and horses in the war zone I thought I would present this article to the profession.

Recently an article appeared in the *British Medical Journal,* January 13, 1917, page 37, describing the treatment of burns with paraffin, which was introduced by Dr. De Sandfort, a French Army Surgeon, who called the preparation he used "Ambrine".

It is not the object of the writer to discredit the paraffin treatment for wounds or burns, but I am of the opinion that if serum could be incorporated with the paraffin it may greatly facilitate the treatment of wounds and burns.

TWO CASES OF MUMMIFIED FETUS

Walter M. Pendergast, Syracuse, N. Y.

Case No. I. On January 15, 1916, I was called to examine a large pure bred Holstein cow for pregnancy.

History. This cow had aborted about a year previous to this time and was bred in April 1915. She had not been in estrum since and the owner supposed she was pregnant.

This cow was very large and in high condition. Upon examination per rectum I discovered that the uterus was drawn forward and downward so that the horns and ovaries could not be reached. I advised the owner that there was probably a fetus in the uterus and that we had better wait about two months before going further. On April 14, 1916 I was again called to examine the cow but did not discover anything different from the first visit. I placed uterine forceps on the os and pulled the uterus as far as possible. Then with my arm in the rectum and two assistants drawing on the forceps, I was able, after inserting my arm the full length, to just touch a hard object in the uterus. The uterus did not feel like a normal pregnant uterus in that it did not seem to contain any fluid. The os appeared to be sealed. I inserted a dilator in the os, after which I inserted a catheter in the uterus and injected about a quart of 2% Lugol's solution, most of which was retained in the uterus. The following afternoon this cow gave birth to a mummified fetus about fifteen inches long. The fetus was dry, hard and blackened but did not seem to have any odor.

After about two weeks the uterus of this cow was treated with 2% Lugol's solution twice at intervals of about ten days. She came in estrum about six weeks after the delivery of the calf and was bred. She came in estrum again about two months later and was bred again and at the present time is very heavy with calf.

Case No. II. On May 8, 1916 I was called to hold a post-mortem on a Holstein heifer two and one-half years old. This heifer was very fat and the history was that she had been bred about a year previous and had failed to get with calf.

Upon post mortem I found a mummified fetus about eight inches long. There did not seem to be any fluid in the uterus and the walls of the uterus seemed to cling very closely to the fetus.

The man who slaughtered this heifer stated that he had discovered this condition in only a very few cases in the many hundreds of cattle that he had slaughtered and also stated that he always had found the cows to be very fat and in fine condition.

DERMATO-MYCOSES IN CALVES

JUAN VARAS CATALA, San Juan, P. R.

While inspecting calves in a dairy stable, property of Felix Rodriguez at Bayamon, Porto Rico, my curiosity was aroused by many large greyish-white scabby spots, which had attained the size of the palm of the hand and some even larger, on the neck, face and body of twelve calves. I removed some scabs, finding underneath ulcerous indentations filled with pus. The attendant informed me that the spots had been on said animals for a long time; that all kinds of treatment was given without results, and that he had contracted the same disease, curing himself with applications of tincture of iodine.

After I got through examining carefully every sick animal I realized that in order to arrive at a definite diagnosis it was necessary to examine microscopically material obtained from the diseased part. Therefore, with a scalpel, I collected some scrapings from the different animals in test tubes which were partly filled with chloroform, and had them shaken for a little while. After the chloroform was poured off, the sediment left was mixed with a 33½% solution of sodium hydroxide; then the fluid sediment was mounted on slides, using cover-glasses, and examined under a powerful microscope with a dry lens, finding a beautiful field of threads and spores of the *Tricophyton tonsurans* which as is known, is the cause of herpes tonsurans.

I immediately ordered the separation of the diseased calves from the healthy ones, quarantined them, and recommended the treatment of the affected part with tincture of iodine.

AZOTURIA

SARCOLACTIC ACID RETENTION AS ITS CAUSE

H. S. EAKINS, Fort Collins, Colo.

Having been more or less constantly interested in azoturia of horses, I have noted the various opinions regarding its etiology as expressed by certain German and American authors.

In the B. A. I. Circular 192, page 372 there is an item about lymph vessels "coursing as intricate and extensive networks in

practically all tissues excepting muscle bundles (but they do not exist in the intermuscular sheaths)".

Referring to Albert P. Matthew's book on Physiological Chemistry, the following may be gained: glycogen is stored up in the liver and in the muscles which contain considerable amounts, horse muscle containing 0.5%. The presence in sausage of horse meat may be detected microscopically by the iodine test, showing a brown reaction. The amount of glycogen in muscles may depend on age and other conditions. Diet may influence it. In weak animals there is less glycogen in the muscles. The liver and muscles may convert glycogen into glucose and may destroy glucose, this being under the control of a special internal secretion of the adrenal gland. Glycogen is reduced from muscles during work or other strain. During this period a great diminution of glycogen may take place, which may be converted into glucose, then oxidized. The energy used by muscles during work may thus be produced by the combustion of glycogen. Most of the sugar burned in the body is burned in muscles, thus warming and invigorating the animal. Exposure to cold stimulates glycogenolysis, because glucose is required for fuel. The skeletal muscles are affected indirectly by nerve impulses to the suprarenals. Suprarenal glands set free substances which markedly affect the metabolism of muscles. Glycogen disappears rapidly from the liver and muscles under exhaustion, due to discharge of adrenalin, from adrenal glands, into the blood. This may also obtain accompanying emotions, fright, extreme vivacity, excitement, muscular exertion, etc. This promotes liberation of the carbohydrate in a condition for rapid burning. By the transformation of glycogen into glucose, large stores of fuel are placed at the disposal of muscle tissue. Psychic nerve impulses, and those due to cold, excitement, vivacity, or to muscular exertions may cause great catabolism, liberating energy, and may stimulate chemical changes of a formative nature. Many acids and other substances are formed from carbohydrates by oxidation. Sarcolactic and succinic acids are produced during muscular work, and acetone in large quantities during fasting. Usually sarcolactic acid is removed as rapidly as it is formed if oxygen is present. If oxygen is restricted accumulation may occur and acidity result. If the *oxidation* or the *removal* of lactic acid is prevented, the muscle remains shortened, "rigor mortis". Such rigid muscle fibres if placed under work strain may rupture. Deprivation of oxygen leads to the conversion of glycogen into sugar."

From the above many ideas may be suggested. Reviewing the usual history of a case of azoturia: during rest periods glycogen is stored in the liver and muscle tissue, while at work consumption of glycogen increases. Nervous phenomena due to different factors as already elaborated, may be sufficient to induce the discharge of adrenal substances into the blood in large quantities. (Proteid metabolism and pancreatic substances should also be considered.) Glycogenolysis obtains, and there appears not to be any control presiding over the quantity reduced in a short time. "Rapid burning" results with the formation of acids (especially sarcolactic) and other products. Oxygen may be utilized, deviated or too small in amount to further reduce the acids, (so-called tissue asphyxiation). There is a poor lymphatic (efferent) supply obtaining especially in large muscular areas, so that resulting is a stasis of metabolic products with rigor of muscles. These muscle fibres will rupture if exertion is forced; there may be a dissolution out of muscle hemaglobin, inflammation and retrograde changes, all of which can easily be accounted for. Cold is not essential to produce this condition, but it may have influence. Chill is a relative term and may obtain in warm weather secondary to the increased muscular combustion. Age, breed, and conditions of disease may have their effect. The liver is of great influence in surcharging the blood with carbohydrates thus aggravating the condition. If the above ideas are correct, investigation should be accorded the therapeutic value of adrenalin in cases of azoturia.

PREPUTIAL CATARRH IN A DOG

H. J. Milks and W. E. Muldoon, Ithaca, N. Y.

Patient was a male brindle and white bull dog about four years of age.

History. The owner gave an indefinite history of digestive disturbances and had administered about one-half ounce of castor oil the day before with good results.

Symptoms. The pulse, respirations, and temperature, as well as the eyes were normal. There was a peculiar twitching of the skin over the back particularly in the lumbar region which appeared to be rhythmic but having no connection with the pulse or respirations. On palpation of the abdomen nothing abnormal was made out except when the prepuce was handled, the twitchings of

the back were more pronounced. The animal was given a small amount of an intestinal antiseptic and one-half ounce of castor oil which was later vomited. No further treatment was given but the animal was brought to the hospital three days later, the owner advising that the twitchings of the back were more pronounced.

DIAGNOSIS. On making a close examination of the prepuce, the mucous membranes were found to be reddened and the inner wall of the prepuce and the bulbous portion of the glans were covered with small papillary excrescences. A diagnosis of preputial catarrh was made and the following treatment given:

TREATMENT. The prepuce was thoroughly cleaned with repeated sluicings of luke warm water and hydrogen peroxide daily, and for two days a ten per cent solution of argyrol was injected. On the third and fourth days of treatment one per cent solution of silver nitrate was injected and for the following five days a twenty per cent solution of argyrol was used. At the end of this time the catarrhal condition had entirely cleared up and the twitching of the back had subsided.

A NEW WORLD'S RECORD FOR THE HOLSTEIN

F. D. WALMSLEY, Utica, N. Y.

While working the territory in the immediate vicinity of Richfield Springs, New York, the writer heard from time to time, rumors of a strange freak in the form of a calf that gave milk. From one day to another our curiousity was aroused until we decided to see this animal, so on May 22nd, having some work near the farm on which this calf was born, we decided to investigate the story. We drove to the farm owned by Mr. Reed, a lawyer of Richfield Springs, were graciously received and viewed this "wonder" for such was the case. This unnamed calf, through whose veins coursed the blood of the great Dekols, was born March 16th, 1917, Sire, King Kalsora Lyons No. 158785 H. F. H. B. and Dam, Piebe Marjoran Dekol 2nd. No. 212566 H. F. H. B., making the calf eligible for registry in the Holstein Friesian Herd Book. The calf in question was a black and white with a white marking in the forehead. When the calf was dropped, the son of the tenant on the farm noticed that the udder was enlarged and called his father's attention to the fact but little was thought of it until the next morning when a neighbor was in the barn who also exclaimed in wonder at

the strange sight of quite a good sized udder on a calf of twenty-four hours' life, also prevailing upon the man to milk the udder out for relief to the calf. This was accordingly done and about a pint of milk was taken from this udder. This went on from day to day about the same when the tenant undertook through the use of camphor, to dry up the udder. This availed him practically nothing so he commenced to milk the calf as a part of the daily chores around the barn and when the writer called, we milked the calf, getting about the usual amount, of which we took a sample for the Babcock test. On the next morning, this sample with a check was tested and the butter fat content measured 5%. This butter fat content measured by the fact that the calf gives about a pint of milk per day would figure about ½ pound of butter for seven days, which we believe is an unofficial Worlds Record for an animal of this age.

FIBRINOUS ENTERITIS IN A HEN

B. F. Kaupp, West Raleigh, N. C.

History. The subject was a single comb Rhode Island Red hen two years old, a member of a town flock. This hen had been setting for two weeks. She appeared ill and left her nest and occupied the corner of a building refusing to pay any attention to the eggs. In walking the legs were jerked up under the body, movements became more difficult and the hen died.

Protocol. *Autopsy.*—The unfeathered portions of the head appeared normal. The carcass was in a fair condition of flesh. The feathers were in a rather unkempt condition. The proventriculus and gizzard were packed with woody grass and hay. This mass completely obstructed the parts and interfered with the normal functions of these organs. The hay extended through the duodenal opening from the gizzard so that this part no longer controlled the kind of material to be allowed to pass into the small intestines. There were hay, pebbles and shell throughout the length of the small intestines and at one point a short distance from the juncture of the small and large intestines as indicated at 2 number I, there was an obstruction which occluded the small intestine. There was an intense inflammation at this point. As a result of the irritation caused by the rough material allowed to pass the gizzard into the small intestines there was an enteritis which involved the entire portion of the small intestines. See figure number I.

MICROSCOPIC STUDY. Specimens of different sections of the intestines were saved hardened in formalin and stained with hematoxylon-eosin and clarified in beechwood creosote for study. Figure number 2 gives a photomicrograph and an excellent illustration of the pathological process. Number 1 is the serous covering of the bowel. Number 2 is a cross section of the longitudinal muscular coat. Number 3 is a section through the circular muscular

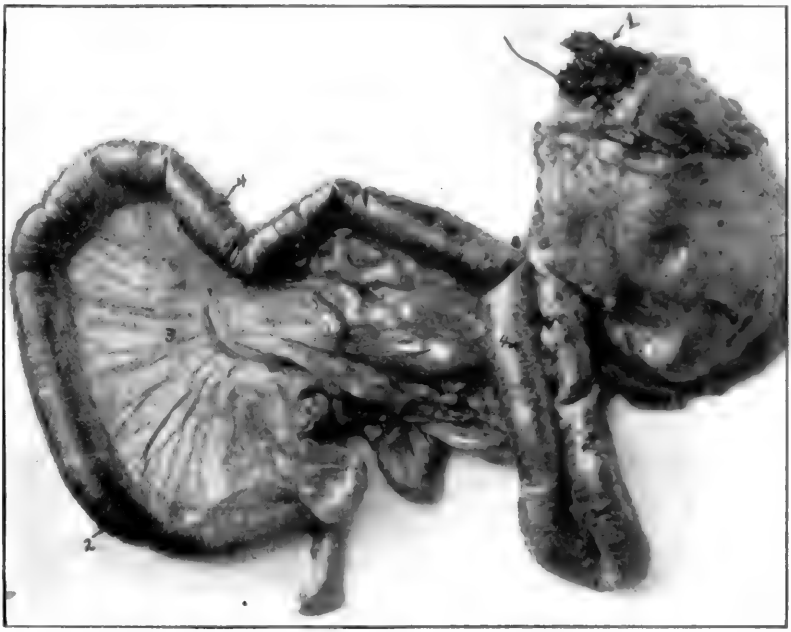

FIGURE No. 1. The opening of the proventriculus into the gizzard. (Note obstruction of the part with hay).
No. 2. Point of obstruction. (Note the intense inflammation).
No. 3. Mesentery.
No. 4. Inflammation and hemorrhage.

fibers and the thickest muscular coat of the bowel. Number 4 is the muscularis mucosa and 5 the stroma. Number 6 is the glandular structure which at this portion is the tubular variety. At number 7 there is noted a condition of cloudy swelling and cellular necrosis. Number 8 shows the intensely cellular infiltrated portion consisting of polymorphonuclear leucocytes and mononuclear cells. Number 9 is a mass of fibrin thrown out on the mucous surface of the bowel. At the point where the mass of course hay obstructed the bowel there was erosion and masses of fibrinous exudation.

SUMMARY. There is here given a study of a case of fibrinous enteritis of a hen.

This fibrinous inflammation is apparently due to the irrita-

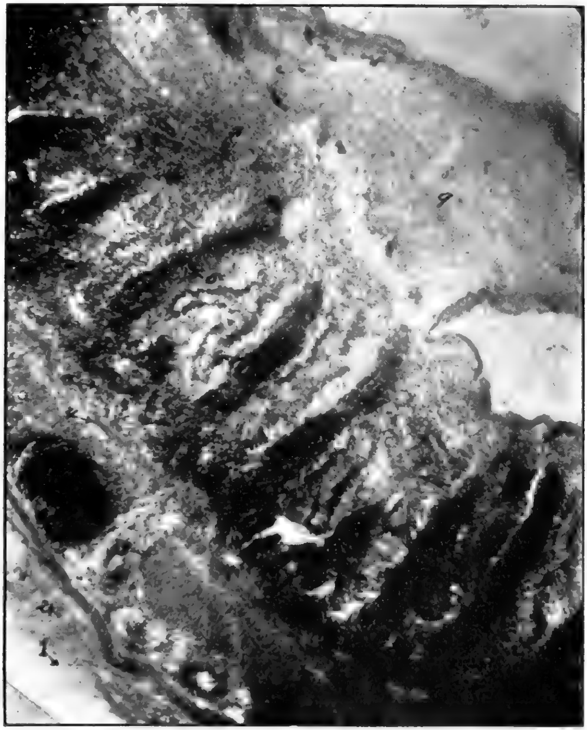

FIGURE No. 2. Fibrinous enteritis of a hen. Photomicrograph.
No. 1. Serous coat.
No. 2. Longitudinal muscular layer.
No. 3. Circular muscular layer.
No. 4. Muscularis mucosa.
No. 5. Stroma.
No. 6. Glands.
No. 7. Ulcerated gland.
No. 8. Cellular infiltration.
No. 9. Fibrinous exudate.

tion caused by coarse, rough material finding its way out into the intestinal tract. This passage of material was made possible by the mechanical interference of the function of the gizzard.

Coarse hay and straw as well as sticks may cause obstruction to the digestive tract of the fowl.

ABSTRACTS FROM RECENT LITERATURE

An Unusual Accident.—J. S. Woodrow, M. R. C. V. S. *Veterinary Record.*—A three year old filly, while being "mouthed" was found to have her tongue through the center ring of an ordinary mouthing bit. The tongue in front of the ring was swollen and protruded some six inches. The ring formed a severe constriction upon the organ. The filly was hard to handle and to relieve her, it was necessary to chloroform her. This was done with some difficulty as the animal struggled, but finally became quiet. The remainder of the operation was easy. The ring was filed in two, the tongue scarified and dressed with a mild astringent. Recovery soon followed. Liautard.

Salvarsan in the Treatment of Canine Distemper. Curt Krocher. *Zeitschrift f. Hygiene u. Infektionskr.*—As a result of very extensive experimental work on the effect of intravenous injection of salvarsan for the prevention and treatment of canine distemper, the author came to the following conclusions: 1. As a result of disagreeable after effects the intramuscular and subcutaneous injection of salvarsan these methods were employed only in a few cases. 2. The intravenous method should be preferred in the dog. 3. The saphenal vein is not adopted for the injection and the infusion may be more readily accomplished in the jugular vein. 4. An infusion apparatus should be preferred to the Record syringe. 4. Dogs show no ill effects from the injections of 0.01 to 0.025 gm. per kilogram of body weight in a dilution of 0.1 gm. to 25–40 c.c. and of alkaline reaction. 6. The administration of larger doses may cause intoxications, as 0.08 gm. per kilogram of body weight produced distinct symptoms of poisoning. 7. Heart weakness, marked pneumonia, gastro-intestinal disturbances, pregnancy, spasms, general debility, probably also nephritis are contra indications. 8. Salvarsan has no preventive action on canine distemper. 9. Salvarsan does not exert a curative nor a favorable action on the course of canine distemper: a. The symptoms of the nervous form of the disease are eventuated by the treatment with salvarsan. b. The pneumonia which develops in the course of the disease is not influenced by salvarsan injections. c. The same applies also to the gastro-intestinal affections, in fact salvarsan appears to increase the irritation on the

excretions of the gastro-intestinal mucous membrane. 10. Salvarsan has no effect upon the pustular exanthema of the skin accompanying distemper. The appearance of new pustules is not prevented thereby. 11. Likewise there was no curative effect observable on the parenchymatous keratitis which appears as a secondary manifestation to the disease. 12. Following the infusion the temperature usually rises in the first hours by 0.1–1.6°C and soon again drops to about its former height. In few cases a fall of 1°C. was observed, but the fever gradually rose to its previous level. 13. Due to the escape of the salvarsan solution a transitory irritation of the tissue developed at the point of puncture. 14. Some of the patients disclosed marked restlessness, pain, depression, inappetence and diarrhea following the infusion. 15. The feces and urine contain arsenic soon after the administration of salvarsan. 16. The results of the urine examination proves that larger doses of salvarsan may produce an irritation of the kidneys.

EICHHORN.

FRACTURE OF PEDAL BONE—OPERATION—RECOVERY. Capt. F. Chambers, A. V. C. *Veterinary Record.*—An artillery charger was struck by a motor on the outside of the foot. He became very lame and showed, after a few days, a greatly swollen coronary band with fetid pus escaping. Cast and chloroformed so as to examine the foot and judge the depth of the injury, the introduction of a probe detected a crack in the os pedis. An operation upon the hoof and laminae permitted the extraction of a piece of bone, one inch long and one-half inch wide. The articulation was not involved. The wound was dressed with tincture of iodine, packed with gauze and bandaged. Lameness was very severe for several days after but gradually the suppuration diminished and the wound healed beautifully. Foot baths daily, dressing with cyanide gauze with eusol solution, chloride of calcium and boric acid formed the whole treatment.

LIAUTARD.

RUPTURED UTERUS IN A COW. Hugh Fraser. *Veterinary Record.* A farmer congratulating himself on the easy way he had delivered a dead fetus from an abnormal parturition, called the writer to see the mother. He found her down but able to get up easily, giving occasional grunts and having the abdomen quite too large for a cow newly calved. She had tympanitis and a tempera-

ture of 104°F. On examining the genitals the membranes were found coming away easily and when they were removed a large rupture in the upper wall of the uterus was exposed. Being in a fat condition the cow was slaughtered. LIAUTARD.

A NON-GAS-PRODUCING STRAIN OF THE HOG CHOLERA BACILLUS ISOLATED FROM AN OLD LABORATORY CULTURE. C. Tenbroeck. *Journal of Experimental Medicine*, Vol. 24, pp. 213-222, 1916.—It is not uncommon to find minor variations among strains of the same species of bacteria, and in cultures that have been kept for several years on artificial media such changes are relatively frequent. It is seldom, however, that one finds a variation in the action on the more commonly used carbohydrates. A review of the literature shows that non-gas-producing paratyphoid strains have been reported by Dorset and other investigators before.

In a stock culture of the hog cholera bacillus (*B. suipestifer*) which was passed through a series of rabbits 14 years ago, an organism was found that differs from the original culture in that it fails to form gas from the carbohydrates that are usually attacked by this organism, while acid formation persists. This new strain is agglutinated by an anti-hog-cholera bacillus serum (but not by anti-typhoid serum) and produces in rabbits and mice a disease similar to that caused by the typical culture. The failure to form gas has persisted over a period of 18 months and all attempts to cause the strain to revert to the original condition have failed. It resembles in many respects *Bacillus typhosus* and it may be that some of the so-called typhoid cultures that are not agglutinated by anti-typhoid serum are non-gas-producing paratyphoids. Attempts to produce a similar change in a more recently isolated culture of the hog-cholera bacillus by means of animal passages and changes in the environment have been negative. BERG.

In the *Journal of the A. V. M. A.*, October 1916, pp. 75-78, I called attention to a controversy between Standfuss and Joest on the hog cholera problem. Standfuss claimed that there is a disease of young hogs, which he called swine typhoid, and which is different from hog cholera. Its etiological agent, the swine typhoid bacillus although similar to *Bacillus typhosus* in its cultural characteristics, can be sharply differentiated from the paratyphoid group.

Joest maintained that swine typhoid was not a disease distinct from hog cholera and that Standfuss' swine typhoid bacillus

was nothing more than an atypical strain of *B. suipestifer* (which is a member of the *B. paratyphosus B* group) several of which atypical strains Joest had described years ago.

Standfuss' strain was not agglutinated by paratyphoid serum (hog cholera serum) while Tenbroeck's strain was; in this respect the two strains differed.

From a typical culture of *B. suipestifer,* Tenbroeck has apparently obtained an atypical strain similar to, if not identical with, the swine typhoid bacillus of Standfuss. This tends to substantiate the claims of Joest. BERG.

TRICHLOR-TERTIARYBUTYL ALCOHOL ANESTHESIA. L. W. Rowe. Reprint from *The Journal of Pharmacology and Experimental Therapeutics,* Vol. IX, No. 2, November 1916.—This compound was discovered in 1881. Since 1895 it has been used as an anesthetic for laboratory use. In 1899 the compound was made practical and was placed on the market under the name "Chloretone." It has marked hypnotic, anesthetic and antiseptic properties. It has a prolonged action on the human subject and so is not advocated as an anesthetic in human surgery. It has proven ideal in experimental physiology or pharmacology where the recovery of the animal is not essential. Blood pressure is not affected and there is a very steady plane of anesthesia. A 40% solution of the drug in partial alcoholic solution does not cause much local irritation when injected hypodermically. The dose for a dog is 0.4 gram per kilogram body weight. 0.3 gram per kilo. will do but is not so rapid in action. The drug is injected into the peritoneal cavity, the injection to be made well forward toward the diaphragm. In about five minutes the animal is restless and shows some muscular incoördination. Complete anesthesia is obtained in about twenty minutes. Reflexes entirely disappear. The dose is easily administered and requires no further attention. The anesthesia is well suited to blood pressure work or experimental surgery. Morphine narcosis followed by one-half the standard dose will insure the recovery of the animal if it is so desired. HAYDEN.

PUNCTURED WOUND OF THE HOCK IN A CART MARE. G. Mayall, M. R. C. V. S. *Veterinary Journal.*—A black mare, 7 years old, got a kick on the outside of the near hock. She was kept at work and three days after there was a discharge of blood and pus from it.

After preparation of the region, strong solutions of iodine were made and injections prescribed three times a day. Following this, the mare was very lame and showed much pain. After two days slight improvement was noticed. The discharge was less. The mare was then put in slings and submitted to cold water irrigations half an hour three times daily, with injection of Lugol's solution and glycerine. The treatment was kept up for some length of time but recovery followed and the mare was able to return to work. This form of treatment is highly recommended by the writer.

LIAUTARD.

ENORMOUS COCCYGEAL ARTERIO-VENOUS DILATATION IN A STEER. Piot Bey. *Rec. de Medecine.*—A six year old steer had an arterial hemorrhage from a swelling about 12 centimeters from the extremity of the tail. It was quite abundant and was readily arrested with a bandage. The steer was in good condition and presented no indication of illness, except the size of the tail which from the ischial arch was quite enlarged, and where the swelling existed was as big as a hen's egg. The terminal end of the organ was normal. The swelling was hairless, had the sensation of arterial pulsations but was not an aneurism. It was a large glomerule which had a very large venous network through which weak pulsations were also felt. It might be considered an arterio-venous aneurism. The steer was not destroyed for some time. When it was, the tail was secured and injected with coloring wax and tallow for dissection. At a short distance from the amputation, the artery was found dilated and remained so to the inferior part of the organ. The walls were thick and the vessel formed numerous circumvolutions. There were two enormous veins, anastomosed by several branches running from one to the other, on the posterior face of the caudal appendix. The other structures of the tail were normal.

LIAUTARD.

NOTES ON THE OCCURRENCE OF EQUINE SPOROTRICHOSIS IN MONTANA AND THE "BLASTOMYCOTIC" FORM OF SPOROTRICHIUM SCHENCKI-BEURMANNI. K. F. Meyer. Reprint from the *Proceedings of the Society for Experimental Biology and Medicine*, 1916, XIV, pp. 23-24.—Sporothrix schencki-beurmanni was isolated on Sabouraud medium from fresh pus collected from a case of equine sporotrichosis. The growth on glucose agar remained white, be-

coming thick, moist, very stringy and inelastic. Sabouraud's agar showed a typical well-pigmented folded film. Microscopic examination of the cultures showed oblong, oval or round, short, monilia-like mycelia with double membrane and refractile granules. There was some reproduction by budding. The cultures appeared like yeast or saccharomyces. "Blastomycotic" pleomorphism occurs in the European as well as the American types. Sera of infected or immunized animals gives the complement fixation test when yeasts are used as antigens. HAYDEN.

COMPLICATIONS. C. W. Cartwright, M. R. C. V. S. *Veterinary News.*—This is the record of an uncommon series of complications that occurred in a cross-bred cow, which fortunately was in good condition and whose robust constitution allowed her to be sold at a great price.

Attended first for slight digestive trouble, she required care for calving. She was due in ten days and was delivered of two living calves without difficulty. Septic metritis set in and while treated for this, laminitis of a metastatic nature attacked all four feet. Scarcely recovered from that, acute mammitis of the hind quarters set in with its consequences. Pneumonia of both lungs, particularly the right followed. All hope for her recovery seemed remote. Yet she rallied and resolution was commencing, when from persistent coughing, due to some liquid entering her trachea while being drenched, and accompanied with rupture of the lung tissue, she had a large emphysematous swelling on the right side, extending from the neck to the hip and covering the neck, shoulders, ribs and loins. Notwithstanding all this, she slowly showed signs of improvement, got a good run to grass, and with this and good food, she finally made a good recovery.

The general treatment was quinine, stimulants and free use of nuclein, iron, nux vomica and general tonics.

LIAUTARD.

CLINICAL NOTES. J. Bouwon. *Veterinary News.* A case of *strangulation of the intestines in a pony.* A concise record where the manifestations were, to the writer, justifiable of a diagnosis of volvulus. The pony died after a short illness. At the post-mortem there was found a strangulation caused by a tumor having a

thick wall of connective tissue which was afterwards examined and reported to be a lipoma. LIAUTARD.

LAMENESS IMPLICATING THE LEVATOR HUMERI. H. Taylor, F. R. C. V. S. *Veterinary Record.*—An interesting case which differs from the general history of shoulder lameness because with it the true lesion was readily recognized. The subject was a butcher's cob, driven in the usual careless manner, and in rounding a corner suddenly slipped, made an effort not to fall and was found suddenly very lame. On examination, the diagnosis of shoulder lameness was made, and in this case it was positively located. The slightest tap with the middle finger on any portion of the levator humeri caused a violent contraction of the muscle and the shoulder joint was jerked forward and inward. No matter where the tap was applied, in the course of the muscle, the manifestation of pain was the same. There was no other noticeable lesion or swelling, only this extreme sensibility of the muscle.

The treatment and result is not explained by the author.

LIAUTARD.

INTERNAL STRANGLES. Capt. Chambers, A. V. C. *Veterinary Record.*—A bay mare was sent to a military hospital as having pneumonia. The diagnosis was not confirmed and she was placed under observation, whereby the various temperatures and manifestations of great weakness, internal abscesses were suspected. She died after eight days of sickness.

Post Mortem. In the abdomen, the stomach was observed adherent to the spleen, which was greatly enlarged and attached to the diaphragm. The liver was of normal weight but studded with multiple abscesses. One was found in the spleen containing about one quart of pus. The organ itself weighed 28 pounds and was a mass of small purulent collections. The thoracic organs were normal. Smears of the pus of the liver and spleen revealed streptococci. The temperature during the disease varied between 104° and 105°F. LIAUTARD.

ABSCESS BELOW THE SIXTH AND SEVENTH CERVICAL VERTEBRAE IN A COW. J. Bouwon. *Veterinary News.*—This animal, about 10 years old, had a good appetite, normal kidney functions, but had difficulty in lying down and getting up. She was, however, much

emaciated, her head was sunk under the feed manger and she was unable to raise it, but could turn it to either side, her back was arched. Pulse 64, respiration 56, nostrils dilated. No change in the eyes. Horns normal, cervical vertebrae showed nothing wrong, the gait was staggering and when she was pricked with a pin, she showed hyperesthesia. The diagnosis was uncertain. The animal was destroyed. At post-mortem, except hyperemia, nothing abnormal was found about the brain. Evidences of tuberculosis were found in the lymph thoracic glands and small tuberculous foci in the lungs. One abscess was discovered below the sixth and seventh cervical vertebrae. It was as big as a man's fist, and probably of tuberculous nature. No bacteriological examination was made. LIAUTARD.

—The following officers of the Veterinary Corps have been assigned as follows: Major W. G. Turner, Corozal, Canal Zone; Captain E. J. Cramer, depot quartermaster, Seattle; 1st Lieutenant J. A. McKinnon, Manila, P. I.; 1st Lieutenant K. A. Lytle, Chicago; 1st Lieutenant O. A. Barber, Fort Keogh remount depot; 1st Lieutenant S. L. Teeple, El Paso; 1st Lieutenant L. E. Case, Honolulu, Hawaii; 2nd Lieutenant J. N. Hornbaker, Front Royal, remount depot; 2nd Lieutenant S. H. Saul, Seattle; 2nd Lieutenant A. G. Fraser, El Paso; 2nd Lieutenant G. W. Brower, Manila, P. I.; 2nd Lieutenant J. W. Burby, Southern department.

—It is reported that the British army sends between 400 and 500 horses a week to Paris butchers to be slaughtered and put on sale in the horse meat markets. The French army furnishes a smaller number. The total makes an important contribution to the feeding of Paris.

—Much concern is exhibited over the high death rate of horses sent from this country to France. In some shipments the rate has been as high as 70%. The malady is as yet mystifying and is still unsolved. Opinions vary, some have suggested poisoning by enemy agents here or on ship board; others think it may be an unusually virulent form of "shipping fever", "forage poisoning", pleuro-pneumonia, etc.

—Dr. J. L. Ruble has been transferred from Fort Bliss, Texas, to Camp Robinson, Sparta, Wis.

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J. H. Grisdale
M. P. Ravenel..........................Univ. of Missouri, Columbus, Mo.
T. W. Tomlinson
J. R. Valentine.

STATE AND PROVINCIAL SECRETARIES

Alabama—W. W. Webb, Auburn.
Arizona—J. C. Norton, Fleming Block, Phoenix
Arkansas—R. M. Gow, Old State House, Little Rock
California—J. F. McKenna, 616 Eye St., Fresno
Colorado—I. E. Newsom, Colorado State College, Ft. Collins
Connecticut—F. A. Ingram, Hartford
Delaware—H. P. Eves, 301 West 18th St., Wilmington
Dist. Col.—R. W. Hickman, 2329 1st St., N. W., Washington
Florida—Fred. W. Porter, 104 West Ross Ave., Tampa
Georgia—W. M. Burson, State Agricultural College, Athens
Hawaii—V. A. Norgaard, Territorial Veterinarian, Honolulu
Idaho—J. R. Fuller, 111 West Commercial St., Weiser
Illinois—W. B. Holmes, 225 E. Washington St., Springfield
Indiana—J. W. Klotz, Noblesville
Iowa—J. W. Griffith, Cedar Rapids
Kansas—L. W. Goss, Agricultural College, Manhattan
Kentucky—Robt. Graham, Experiment Station, Lexington

Louisiana—E. I. Smith, 604 Roumain Bldg., Baton Rouge
Maine—H. B. Westcott, 1008 Congress St., Portland
Maryland—F. H. Mackie, 1035 Cathedral St., Baltimore
Massachusetts—T. E. Maloney, 1095 North Main St., Fall River
Minnesota—W. F. Lewis, Waseca
Mississippi—O. N. Norton, Greenville
Missouri—R. F. Bourne, 1336 E. 15th St., Kansas City
Montana—A. D. Knowles, 302 S. 4th St., Missoula
Nebraska—S. W. Alford, State Farm, Lincoln
Nevada—W. B. Mack, University of Nevada, Reno
N. Hampshire—A. C. Farmer, Berlin
N. Jersey—T. E. Smith, 309 Barrow St., Jersey City
N. Mexico—G. A. Lipp, Roswell
New York—W. Reid Blair, N. Y. Zoo Park, New York
N. Carolina—B. F. Kaupp, West Raleigh
N. Dakota—C. H. Babcock, New Rockford
Ohio—N. D. Backus, 345 W. 2d St., Elyria
Oklahoma—J. E. Nance, Anadarko
Oregon—B. T. Simms, Oregon Agricultural College, Corvallis
Pennsylvania—H. B. Cox, 1516 Snyder Ave., Philadelphia
Philippines—Stanton Youngberg, Bureau of Agriculture, Manila
Rhode Island—T. E. Robinson, 65 Main St., Westerly
S. Carolina—B. K. McInnes, 57 Queen St., Charleston
S. Dakota—John T. E. Dinwoodie, Brookings
Tennessee—F. W. Morgan, 6th and Cherry St., Chattanooga
Texas—A. A. Foster, Dallas
Utah—John Ernst, Jr., 126 East 4th South St., Salt Lake City
Vermont—G. T. Stevenson, Burlington
Virginia—Wm. G. Chrisman, Blacksburg
Washington—J. T. Seeley, 1101 Westlake Ave., N., Seattle
W. Virginia—S. E. Hershey, Lock Box 283, Charleston
Wisconsin—W. A. Wolcott, 735 E. Washington St., Madison
Wyoming—H. R. Millard, 2507 Central Ave., Cheyenne
Alberta—M. V. Gallivan, P. O. Box 567, Lethbridge
British Columbia—J. G. Jervis, 3694 Victoria Drive, Vancouver
Manitoba—Wm. A. Hilliard, 630 McMillan Ave., Winnipeg, Man.
New Brunswick—D. McCuaig, McAdam, Jct.
Nova Scotia—Geo. Townsend, New Glasgow
Ontario—Geo. Hilton, Bureau of Animal Industry, Ottawa
Pr. Ed. Is.—W. H. Pethick, Charlottetown
Quebec—A. A. Etienne, 67 Drummond St., Montreal
Sask'wan—M. Barker, Saskatoon, Box 463

SECRETARY'S OFFICE

1827 South Wabash Avenue, Chicago, Ill.

ARMY SERVICE

Veterinary service in the army, other than the Regular Army, as viewed from this office seems to be in an unfortunately pitiful condition, both for the government and the veterinarians, and in spite of the fact that this association through men who have studied army veterinary service abroad during this war and others who served the army during the Spanish-American War and the Philippine revolution have volunteered to advise the government on the requirements of an efficient service, little inclination has thus far been shown toward an improvement of this service. Why we should cross the ocean to fight armies which lack nothing in organization handicapped in this or any other particular is beyond our comprehension, and those of us who have sons on the firing line may feel this shortcoming more keenly than others.

It has been shown emphatically that horses are a mighty important factor in modern warfare, despite the impression that mechanical transportation of men and supplies on the battle fields have replaced them. Besides horses are such costly commodities once trained and transported into Europe for service that any neglect to conserve them seems like willful negligence.

Our veterinary colleges in the spirit of patriotism and at the earnest solicitation of the government are bending their efforts to supply some two thousand veterinarians for immediate service and while we have no accurate information as to the number thus far obtained, we know they come largely from the graduates of 1917 selected in at least some cases with little regard for their fitness. As these men enter the service without experience either in the army or elsewhere and as they will have but little tutorage from older men who rank them there is danger that veterinary service in the United States Army will be discredited.

This association will continue to do what it considers is its greatest patriotic duty—that of giving the government the best information it has about what constitutes a proper veterinary organization for the approaching conflict. With a proper organization in which veterinarians will be given authority to utilize their knowledge and skill for the good of the service, it is evident from information falling upon our desk from day to day that many of

our best practitioners stand ready to sacrifice personal interests at once by giving their service to the nation. Today they stand back fearing they will be humiliated personally and their profession discredited.

Circular from President Wilson.—Under date of June 8th the Secretary to the President, replying to inquiries about the advisibility of foregoing conventions during the war writes: "The President asks me to say that there is no sufficient reason for foregoing conventions and general commercial meetings by business interests so far as he can see." Signed, J. P. Tumulty.

Final Report About Rates to Kansas City.—The selling dates from all points east of the Mississippi are August 17th, 18th and 19th and the last returning date is August 29th.

The selling dates from California points are August 14th and 15th and from North Pacific points August 10th, 11th, 17th and 18th. The rate from California points for the round trip is $67.50 and from North Pacific points $67.50 direct and $74.35 via St. Paul.

Southeastern and Southwestern delegates should inquire of their agents about special excursion rates promised by the passenger associations covering these territories.

Program.—It is not thought advisable to print the uncompleted program again in this issue since it is the intention to publish it in the fullest detail in the August issue. Secretary Munce of the Section on Sanitary Science and Police already reports a program for this section that leaves nothing to be desired, and promises additional contributions which should be in our hands in a few days.

Chairman Ferguson and Secretary Blattenberg of the Section on Practice and Surgery have formulated an entertainment the like of which has never been presented at an A. V. M. A. meeting for the benefit of practitioners. L. A. Merillat, Secretary.

HOTEL ACCOMMODATIONS.

The Local Committee on Arrangements recommend that those who anticipate attending the meeting should engage rooms at once. This may be done by writing to the hotel direct.

Headquarters are at the Muehlebach. Five additional hotels, fire-proof and of modern equipment, are situated just across the

intersecting streets from headquarters, 12th and Baltimore. There are others near by.

The committee offers the following information concerning hotel rates:

Hotel	Address	Hotels Available for Convention Members With Bath Rooms	Rate	No. of Persons	Without Bath Rooms	Rate
Muehlebach, 12th and Baltimore		20	\$4.00	1 or 2	20	\$3.00–\$3.50
(Headquarters)		100	5.00	1 or 2		
		30	6.00	1 or 2		
		20	7.00	1 or 2		
		10	10.00	1 or 2		
Baltimore, 12th and Baltimore		75	\$3.00–8.00	1	25	\$2.00–\$3.00
			4.00–10.00	2		3.00– 4.50
Dixon, 2th and Baltimore		30	2.00–2.50	1	20	1.50
			3.00–3.50	2		2.00
Sexton, 12 West 12th St.		50	1.50–2.50	1	20	1.00
			2.50–3.50	2		1.50
Bray, 1114 Baltimore		40	1.50–2.00	1		
			2.00–2.50	2		
Majestic, 1215 Baltimore		25	1.50–2.00	1	20	1.00
			2.50–3.00	2		2.00
Coates, 10th and Broadway		25	1.50–2.00	1	25	1.00– 1.50
Savoy, 9th and Central				1	50	1.00– 2.00
Washington, 12th and Wash'ton		30	1.50–2.50	1	30	1.00– 2.00
Wyandotte, 11th and Wyandotte		20	1.50–2.00			

There are also thirty or more small hotels within a radius of five blocks of Headquarters.

MASSACHUSETTS VETERINARY ASSOCIATION

The regular monthly meeting of the Massachusetts Veterinary Association was held at the Quincy House, Boston, February 28, 1917. The meeting was called to order by President Peirce. The records of the previous meeting were read and approved.

The president announced the appointment of the following committee to revise the constitution: Drs. Cahill, Howard, and Frothingham.

On motion, it was moved that the speaker of the evening, Dr. Charles H. Duncan of New York City, be asked to speak before the regular order of business was taken up.

Dr. Duncan gave us a most interesting talk on the subject of autotherapy, of which he is the discoverer. His opening remarks

were that the father of all vaccine therapy was a veterinarian, Lux by name. His theory was called Isothapy The following excerpts are taken from Dr. Duncan's remarks:

That the natural habit seen in most animals of licking their wounds is really practicing auto-immunization; that during the present great European War, it has been customary to have soldiers who are wounded practice the same method, namely to lick the wound if it can be reached, or if it is in such a place that this cannot be done, to pack the same with cotton or gauze and then after the removal of the packing, to chew the same, swallowing the discharge, and thus gaining an immunity. In a deep penetrating wound a drain is inserted and the discharge swallowed. In cases where the suppurative discharge is swallowed by the patient, the results are almost instantaneous and arrest suppuration. In nursing mothers, both animal and human, where arrested lactation or "drying up" is noticed, if a small amount of milk is injected hypodermically, it will act as a galactagogue, and cause profuse flow of milk.

Dr. Duncan's remarks were extremely interesting and forceful, and it was generally agreed that his address was one of the most interesting to which we have listened for some time. He was extended a rising vote of thanks.

The Secretary read House Bill 1590, which read more as a joke than anything else, and which was directed against all dogs. The association was recorded as being opposed to this bill.

The Secrteary read a letter recently received from Dr. Winchester, which quoted Dr. Liautard regarding the Belgian relief fund. Moved by Dr. Sturges, seconded by Dr. Balkam, that the Secretary send a check for $25 to Dr. Liautard.

The following applications for membership were received: Dr. H. N. Eames, Wilmington; Dr. E. C. Campbell, Boston; Dr. W. F. McNamara, Worcester.

Several members expressed opinions regarding the annual banquet.

The Secretary announced that Dr. W. Horace Hoskins of Philadelphia had been elected to the executive committee of the A. V. M. A. to represent this district.

The President called attention to the fact that there was to be a civil service examination for veterinarians for the Dept. of Animal Industry.

Dr. C. H. Playdon reported an unusually interesting case of tuberculosis in a horse, and at his request the laboratory findings were described by Dr. Cahill.

Adjourned at 7:30. E. A. CAHILL, Secretary.

May 23, 1917.

The Annual Meeting of the Massachusetts Veterinary Association was held at Young's Hotel, Boston, on April 26, 1917. The meeting was called to order by President Peirce, and the minutes of the previous meeting approved as read.

The Secretary-Treasurer distributed copies of his annual report among the members.

Dr. Howard for the Executive Committee reported that it had audited the Treasurer's account, and found the same correct. Moved by Dr. Thayer, seconded by Dr. Plaskett, that the Executive Committee's report be accepted. Carried. Moved by Dr. Plaskett, seconded by Dr. Peirce, that the Secretary-Treasurer's report be accepted. Carried.

The election of officers being the next order of business, it was moved by Dr. Winchester, seconded by Dr. Playdon, that the President appoint a nominating committee of three. Carried. The President appointed Drs. Plaskett, Playdon, and Clark.

The Secretary read a letter from Charles H. Cole, Chairman of the Committee on Land Forces, in answer to a communication from this association.

The application of Dr. R. L. Burnett of Conway was taken up for consideration. It was moved and seconded that the secretary cast one ballot electing him to membership. This was done, and Dr. Burnett elected to membership. The following applications for membership were received: Dr. Edw. J. Welsh, Fall River; Dr. Richard J. Dinsmore, Framingham; Dr. Harry H. Newcomb, Salem; Dr. Wm. F. Schroeder, Somerville.

In pursuance with the constitution, these were laid on the table for one month. The nominating committee reported the following nominations for officers for the ensuing year:

President, Dr. W. M. Simpson, Malden; First Vice President, Dr. Harry Lukes, Springfield; Second Vice President, Dr. Leon A. Paquin, Webster; Secretary-Treasurer, Dr. Edw. A. Cahill, Lowell.

It was moved by Dr. Cleaves, seconded by Dr. Thayer, that the secretary cast one ballot, electing these officers. Carried.

Dr. Winchester, after obtaining the floor, spoke on tuberculosis, and offered the following resolution:

WHEREAS, It has come to the notice of the Massachusetts Veterinary Association that Section 31, Chapter 90 of the Revised Laws, as amended by Chapter 322, Acts of 1903, is inadequate;

WHEREAS, It is recorded in Public Document No. 98 for the year 1917, and complying with the present law, 87 known cases of tuberculosis in cattle are at large;

WHEREAS, The Revised Laws, as amended, make optional with officials the use of tuberculin as a diagnostic agent;

WHEREAS, The real aim of the veterinary profession is not simply the conservation of commercial interests, but the preservation of human life, which is both economic and humanitarian; now therefore, be it

Resolved, That the Massachusetts Veterinary Association at its 36th Annual Meeting empowers its President to appoint a committee to revise the laws relating to the diagnosis and disposal of cattle with tuberculosis, and to make such suggestions as they deem necessary to the next General Court. Be it further

Resolved, That the Massachusetts Veterinary Association as a body or by representatives appear before the Legislature for the year 1918, recording the approval of such action.

Moved by Dr. Emerson, seconded by Dr. Peirce, that the resolution be referred to a committee appointed by the chair. Carried.

Moved and seconded that a rising vote of thanks be extended to the retiring president. Carried.

Following the meeting, seventy-five members and guests assembled in the banquet hall for the annual banquet. The menu proved to be of its usual high standard, and was enjoyed by all. The president announced that the toatsmaster for the evening would be Dr. Lester H. Howard. Dr. Howard offered the usual remarks as to being surprised and unprepared, etc., but it was noticed that as usual he filled the office most fittingly. The toastmaster then introduced the chief speaker of the evening, Dr. D. H. Udall of New York State Veterinary School, Cornell University, Ithaca, N. Y.

Dr. Udall's subject was tuberculosis, and proved to be a masterpiece on this subject. He dealt particularly with the eradication of tuberculosis from a dairy herd, with particular reference to physical examination, and laid particular stress on the use of the sputum cup in obtaining samples for bacteriological examination. An immense amount of statistics have been obtained by Dr. Udall on this subject, from which he quoted at considerable length. The outstanding feature of Dr. Udall's remarks was his opinion on building sanitary cow-barns, particularly with reference to the mangers. At the conclusion of Dr. Udall's remarks, he was extended a rising vote of thanks.

The remainder of the evening was taken up by a quartet of entertainers known as the "Florentine Musicians". They are professional entertainers of great ability, and entertained everybody in a most capable manner.

The meeting was adjourned at 11 P. M.

EDWARD A. CAHILL, Secretary.

CALIFORNIA STATE VETERINARY MEDICAL ASSOCIATION.

The following program was prepared for the California State Veterinary Medical Association and its Southern auxiliary:

The Milk Goat Industry..........L. E. Chaney, Kings City
Some Hints on Ophthalmology..........J. L. Tyler, Pomona
Essentials of the Veterinary Hospital
E. C. Zickendrath, Palo Alto
New Blackleg and Anthrax Immunizing Agents
O. A. Longley, Oakland
Service by Veterinarians During the War
Discussion opened by.......Chas. Keane, Sacramento
Human Surgical Clinic.....Chas. W. Levison, San Francisco
Visit through San Francisco Hospital

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY.

The semi-annual meeting will be held at Asbury Park, N. J., July 12 and 13.

Among the papers to be presented will be the following:

State Veterinary Medicine
W. Horace Hoskins, Philadelphia, Pa.

Hog Cholera Control in New Jersey
Professor F. C. Minkler
Live Stock Commissioner, Dept. of Agriculture of New Jersey
Veterinary Biological Therapeutics
A. Eichhorn, Pearl River, N. Y.
Dairy Cattle and Breeding Problems
J. F. DeVine, Goshen, N. Y.
E. L. Loblein, Secretary.

FLORIDA STATE LIVE STOCK SANITARY BOARD.

Florida now has a State Live Stock Sanitary Board, created by act of the last legislature, to take over the administration of live stock sanitary matters, which heretofore have been handled by a state veterinarian and assistants working under the State Health Board. The funds for that department were limited and very little organization work was done for eradication of cattle fever ticks.

The legislature appropriated $150,000 for the ensuing two years for the State Live Stock Sanitary Board to use in eradication of ticks and control of hog cholera and other animal diseases.

It also authorized the county commissioners in each county to appropriate up to two mills per annum on the assessed valuation of property for building vats and co-operating with State and Federal Government officials in eradicating ticks.

This insures rapid progress of tick eradication work in Florida.

The State Live Stock Sanitary Board is composed of the Commissioner of Agriculture, who shall be ex-officio president of the Board; Superintendent of Instruction; State Treasurer; and two other members to be appointed by the Governor, who shall hold office for four years, or until their successors are duly appointed and qualified.

The Board members are not allowed a salary or per diem, but may receive their actual expenses incurred in discharge of their duties as members of said Board. They shall select and employ an experienced veterinarian, who will be the chief executive officer and secretary of the Board, who shall be known as State Veterinarian. He shall not be dismissed except for cause, and shall give bond in the sum of $10,000 for the faithful performance of his duty.

CONFERENCE OF STATE AND FEDERAL VETERINARIANS.

The importance of State and Federal Government veterinarians getting acquainted with and so far as possible co-operating with practicing veterinarians when working in their local territories was emphasized at a meeting held in Jacksonville, Florida, June 1st and 2nd.

Dr. E. M. Nighbert, inspector in charge of tick eradication work in Florida for the U. S. Bureau of Animal Industry, called in all of his men for a conference. He also invited Dr. Charles F. Dawson, state veterinarian, and his assistants; Dr. E. F. Haven, inspector in charge of meat inspection in Florida for the U. S. Bureau of Animal Industry, and his assistants; and the practicing veterinarians in Jacksonville.

A number of the invited guests took part in the program and offered helpful suggestions for increasing the efficiency of the men in the field by getting acquainted with the local practicing veterinarians and showing some interest in their work.

Instances were related of work being retarded in some other states because the local men had not been advised of the program to be carried out, and had discouraged their clients when consulted as to what should be done under certain conditions.

The question box was an innovation at such conferences and furnished subjects for several hours of discussion which brought out valuable information on handling local problems in the field.

Dr. E. M. Nighbert gave a lecture on "Tick Eradication and the Effects Upon Cattle, the Result of Dipping in Standard Arsenic Solution". He emphasized the statement that some people are more affected by seeing their cattle dipped the first time, than are the cattle. The former are very nervous, while the stock swims through the dipping solution and go to grazing as soon as turned out of the drip pen. It is as necessary to handle the people carefully as it is to keep the cattle from getting excited. The results of the first dipping will convert the owners to advantages of eradicating ticks and then systematic work will come quickly.

Dr. R. E. Jackson, inspector in charge in Alabama was assigned to represent Dr. R. A. Ramsey, Chief, Tick Eradication Division, Washington, who was unable to be present, and gave a very interesting report of organization work in his state.

Dr. Nighbert and his men gave a banquet to all of the guests who attended the conference, at which President F. C. Groover of the Jacksonville Chamber of Commerce was the main speaker, although a number of brief talks were given by those present. Dr. Nighbert served as toastmaster and introduced each speaker with some humorous reference to tick eradication.

SOUTHERN TIER VETERINARY MEDICAL ASSOCIATION.

The following program has been prepared for the meeting of the Southern Tier Veterinary Medical Association at Elmira, N. Y., July 7:

9:30 A. M.—THE CLINIC will be held at the Hospital of Dr. A. J. Battin, 456 West 1st Street, Elmira, N. Y.

AFTERNOON SESSION—Forage Poisoning—Infection or Poisoning
Dr. P. J. Axtell, Binghamton

The Stallion Registration Law — Dr. J. G. Wills, Albany

The Technique of Douching the Uterus
Dr. W. L. Williams, Ithaca

EVENING SESSION—A Discussion of Case Reports
Opened by Dr. D. H. Udall, Ithaca, N. Y.

KEYSTONE VETERINARY MEDICAL ASSOCIATION

The regular monthly meeting of the Keystone Veterinary Medical Association was held on Tuesday evening, June 12th, 1917, at 9:00 P. M. Large attendance. The program for the evening was as follows:

The Relation of Botulinus Intoxication to Forage Poisoning
Drs. John Reichel and Malcolm J. Harkness

Report on Three Cases.......Dr. Cheston M. Hoskins

How Federal Meat Inspection is obtained and Carried On.........................Dr. C. S. Rockwell

These papers were very interesting and thoroughly discussed by several members.

There was a motion made and carried to invite the A. V. M. A. to meet in Philadelphia in 1918, and the President was directed to appoint a Committee to be known as the "Boosting Committee'.

A motion was made and carried to give Dr. and Mrs. W. H. Hoskins a banquet at the Hotel Walton, Philadelphia, on Tuesday evening, June 19th, 1917 at 7 P. M., as they are leaving Philadelphia to reside in New York, Dr. Hoskins having accepted the Deanship of the New York State Veterinary College.

There being no further business the meeting adjourned at 11:45 P. M. C. S. ROCKWELL, Sec.-Treas.

COMMUNICATIONS

PATRIOTIC AND PROFESSIONAL DUTY.

Editor Journal of the American Veterinary Medical Association:
Ithaca, N. Y.

It is not necessary to point out to our profession their duty at this time when our country needs us. While we have had difficulty in the past in securing legislation that would give us the professional standing that we should have, and to provide for an efficient veterinary organization for the army, now is not the time for recrimination, criticism or halting. Our country needs us and we will go whenever and wherever needed, whether it be in the ranks or in a professional capacity. We are sure the veterinarians of the United States will respond just as have the veterinarians of Canada or our professional brothers across the sea. Some of us are physically able to go wherever we may be needed most, and some for good reasons must remain at home and do the best they can under the circumstances. Many veterinarians will make great sacrifices in joining the colors. They will leave their families and the comforts of home life and in most cases also a practice that they have worked hard for years to build up. Their practice must be looked after by those who cannot go to the front. We hope and believe that every veterinarian will not only look after the practice of his brother who leaves it in response to the call of a patriotic duty, but will conserve and hold that practice for him to the very best of his ability. Let us forget the petty jealousies that competition so frequently develops and say to those who leave: "We will take care of your practice for you." The medical profession is doing this. Let us go them one better and take care of their practice and also of their families, if the need be.

N. S. Mayo.

ARMY VETERINARY SERVICE.

Editor Journal of the American Veterinary Medical Association,
Ithaca, N. Y.:

To increase the efficiency of the mounted and transportation services it will be necessary: (a) to class all animals as public and not belonging to any particular organization, such as troop, supply troop, pack, etc.; (b) to keep the man on the fighting line as efficient as possible by supplying him with a good sound animal at all times.

This will require: (a) a Remount Corps with enlisted personnel; (b) a Veterinary Corps with enlisted personnel.

The Remount Corps should: (a) encourage breeding of the proper type; (b) buy the proper type at their own collection points; (c) build their proper depots for training, shoeing and issuing (stationary depots); (d) accompany troops sufficiently

near so as to issue sound and to take back unserviceable animals for recuperation and sale (mobile depots).

The Veterinary Corps should: (a) attend to the general welfare of all public animals, and treat the sick, etc.; (b) shoe all public animals; (c) condemn all public animals.

At present the animals are managed principally by amateurs instead of by experts and organizations devoted solely to that purpose.

A Troop Commander should not have to trouble himself about sick horses, shoeing, and condemning; he has many other things to do and also has not enough real knowledge or education on these subjects. He has to be a jack of all trades and both men and animals suffer in consequence.

The Veterinary Corps should be run with the idea of completely relieving the fighting line of all responsibility with an unserviceable animal. At present a mounted organization religiously insists on dragging its sick animals forward instead of sending them back for proper treatment and getting fresh mounts in return.

The Veterinary Corps should take complete charge of a sick animal by removing it from a troop, etc., to its own hospital or lines, and if the animal is considered to be unserviceable for some length of time a fresh animal should be issued to the troop by the Remount Depot as soon as possible. This simply requires a receipt given to the Troop Commander by the veterinarian and a receipt from the Remount Officer to the veterinarian. The animal when fit for duty can be issued to another organization. This carries out the main idea of a public animal, and keeps the fighting line in the only proper state of efficiency it should be brought up to by means of the animal question.

Horse shoers should belong to the Veterinary Corps and be assigned by them to organization, this will make for continuity of method, etc., fixes responsibility and does away with the present amateurish individualism.

Condemnation of animals also should be done by veterinarians who are experts and have their sick reports, and not by amateurs possessed in many cases with sentiment for the animal in question.

The Remount Corps should have a Colonel at the head of it and be composed of the picked horsemasters of the mounted services with a trained personnel of about one officer per 500 animals and 10 enlisted men per 100 animals.

The Veterinary Corps should have a Colonel at the head of it with a trained personnel of one veterinarian per 500 animals and three enlisted men per 100 animals, in proportion of one farrier and two horse shoers. This will give a regiment two veterinarians, twelve farriers and fifteen horseshoers or more besides supplying the Remount Corps as well.

The Remount Corps and veterinary personnel should be noncombatants in order that nothing should take away from the important duty of supplying, at all times, the fighting lines with efficient animals. This also tends to the formation of a stable and highly trained personnel instead of the present unsettled, happy-go-lucky method of a combined man and indifferent performer, the last a radical outcome owing to a low plane of education in general, which allows the mind to be easily diverted by a change of duties. The procedure of a veterinary unit attached to a regiment would be about as follows:

2 veterinarians and mounts; 12 farriers to be assigned to organizations; 15 horse shoers to be assigned to organizations; 24 horses; 1 wagon; 4 mules; 2 officers' tents (1 for officer and 1 for medicine, etc.); 4 tarpaulins (18x30) or (20x40); 4 pyramid tents; 16 poles (half 8 ft.) and (half 10 ft.); sufficient rope to put up paulins and picket line; medicines and equipment; food for men and animals.

The personnel to affiliate with the Medical Corps Detachment and all mess together if possible. At the end of March the four tarpaulins to be put up in prolongation making a covered shelter 66 feet long and 20 feet wide with picket line through the centre. Then men are assigned to troops to collect all sick animals at the hospital where they are treated and made as comfortable as possible.

Any seriously sick animals are sent back next day to the base or division hospitals, etc., and Remount Corps notified to send forward a like number of fresh animals. Mild cases to be led next day by farriers and horseshoers. Hopeless cases to be promptly destroyed. Cases temporarily unserviceable to be taken back by Remount Corps for reissue.

If a squadron is detached from its regiment and veterinarians and several farriers can accompany it with a paulin and sufficient equipment and one wagon could be used for both the Medical Corps and the Veterinary Detachment. It will be contended that the overhead charges for these organizations will be large, possibly so, but the increased efficiency of the fighting line will more than compensate besides a counter balance in the fact that animals will render longer life of service than the present low average. Also as both the Remount Corps and Veterinary Corps would have to render daily and monthly returns in regard to the breed, qualifications, sickness, treatment, service and death of the animals; these reports could be consolidated into one statistical report each year so that one could see how many animals in each troop and regiment suffered from unpreventable diseases; how many young remounts died before their time or proved unserviceable and from what causes, etc., what breeds of animals stood the work; what forms of treatment were more successful; where the best types of

animals were bred. With these reports, in a few years' time we would have most valuable and practical information for the army at large to read, whereas at present not even a troop commander knows how many sick horses he has had in a year and a Colonel of a regiment does not even know about the sick or remount records of his regiment or of any other regiment. How then, can any real information be gained under such conditions?

For instance an Infantry Inspector General will come around and condemn the animals of a regiment and he has to trust to somebody for his knowledge. Then a number of remounts are sent to fill up; they may come at any time and in any quantity; sometimes they come just before target practice or during marches and manoeuvre periods, consequently they may be taken along or neglected till the winter season starts; both methods are bad.

Primarily the most important objective will be the breeding of a proper type of animal, especially of horses.

Owing to the enormous buying of the European nations during the last three years this country has been depleted of good light horses for army purposes, also owing to the present contract system of buying employed by the War Department the farmers have largely stopped breeding an army horse on account of low purchase price. Consequently it should be strongly brought to the attention of the Government that large premiums should be given in each state for the best remount sizes, dams and progeny. It should be the business of the Remount Corps to judge on these premiums and otherwise get in touch with the breeder for the purpose of encouraging the breeding of a good type of horse.

Then the Remount Corps can have a settled policy in regard to type, remount stations, handling, training and issuing to troops. This can only be properly done by close affiliation with a Veterinary Corps with an enlisted personnel for each organization.

The present system of buying is a poor one in that it is merely a question of individuals and opportunism, this leads to great varieties in types of animals bought to the manifest detriment of the mounted services. Then animals are bought in centers of infection and arrive at their ultimate destination so sick as to be useless for work for several months, also at the receiving depots, no proper arrangements are made to keep the animals in condition or gentle the unbroken ones, thus neglecting the main idea of supplying the front line with a serviceable animal fit to go to work immediately. In fact troops have to suffer depletion in order to send back men to bring weak and ailing horses from the Remount bases to the fighting line, and many of these animals die en route.

Remount depots should be so constructed and organized that every well animal gets at least ten miles around a track every day and convalescent animals proportionally as to their condition. All these animals should be properly shod, and broken to be shod quietly before they join troops, but it is a common sight to see ani-

mals with shoes buried in the substance of the hoof and others with feet six or seven or eight inches long.

An animal that has wandered around a corral for several months with long and untrimmed feet is useless on the fighting line, it will take two or three months to get him in shape to be really serviceable. With a Remount Corps and Veterinary Corps made responsible, these conditions would not exist, if they did, then the blame can be promptly attached and the faults remedied.

Let the army animal be served by experts devoted to that purpose and trained especially along systematic and well established lines.

Let them be public animals and not parts of a small unit controlled by several masters; the old adage that "too many cooks spoil the broth" is very suitable. R. Vans Agnew.

REVIEW

THE MICROSCOPE. AN INTRODUCTION TO MICROSCOPIC METHODS AND TO HISTOLOGY

Simon Henry Gage,
Professor of Histology and Embyrology, Emeritus, in Cornell University
Twelfth Edition. Rewritten and illustrated by over 250 Text Figures
The Comstock Publishing Co., Ithaca, N. Y. 1917.

It is a statement universally true, that the better a skilled workman knows his tools, the better work can he accomplish with them. This particularly applies to that delicate and intricate instrument, the microscope. For many years the only satisfactory book in the English language for general use has been the one whose twelfth edition has now appeared. The author has in each succeeding edition most painstakingly brought it abreast of the times and made it thoroughly up to date. This is preeminently true of the present edition which has been extensively rewritten, thoroughly revised and enlarged by one-third over the edition that preceded it. The chapters are increased from ten to twelve and many of the earlier figures have been replaced with new ones.

For all users of the microscope in biological work, whether they be students or investigators in the field of veterinary and human medicine, zoology, or botany, Gage's "The Microscope" will continue to be, and in still greater degree, a book of great

value which should be always available for general use or consultation.

The Microscope, its theory, principles and structure; its use and application; together with chapters on magnification and micrometry, drawing with the microscope; the projection microscope; photography with the microscope; the spectroscope and polariscope; and two chapters on mounting and storing microscopic preparations; fixing, imbedding, sectioning, staining; the preparation of serial sections and the preparation of models of microscopic objects, are the topics fully and clearly presented. The last chapter (XII) is new, on the history of lenses and the microscope.

The students and graduates of veterinary medicine have a peculiar interest in this book as its growth has been intimately connected with veterinary teaching. This particularly applies to those of the New York State College of Veterinary Medicine at Cornell University, whose students for ten years enjoyed the personal guidance of the author whose clarity as a teacher we find embodied in this book. Former students of Professor Gage will welcome this last crystallization of his clear teaching; and to those who have not enjoyed his personal instruction, this volume is heartily recommended as a substitute and a guide.

B. F. KINGSBURY.

—Dr. W. H. Lynch, of the Portland Veterinary Hospital, Portland, Maine, has been appointed member of the Maine State Veterinary Examining Board by Governor Millikin. This is Dr. Lynch's third consecutive term on the Board of which he has been Secretary since very shortly after his first appointment. This Board met for reorganization in May at which time Dr. Lynch was again elected Secretary of the Board. Dr. I. L. Salley of Skowhegan was elected President.

Dr. Lynch will be glad to communicate with any veterinarian who may contemplate coming into Maine to practice veterinary medicine.

—The New York State Veterinary Medical Society, upon a postal vote of its members, has decided not to hold the annual meeting, July 25, at Brooklyn, N. Y.

NECROLOGY

HARRY H. BEAR.

Dr. Harry H. Bear graduated from the New York American Veterinary College, Class of 1893. He was born at Mt. Joy, Pa., November 7, 1870, and died February 27, 1917. from diabetes. He practiced at Mt. Joy since the time of his graduation, had many friends and was much respected by those who knew him. Dr. Bear is survived by a wife, two sons and three daughters.

LAURENCE L. PEIRCE.

Dr. Laurence L. Peirce of Arlington, Mass., died on April 28, 1917, of Bright's disease. He was forty-two years of age, and was a resident of Arlington all his life. Dr. Peirce was one of the most respected veterinarians in the State of Massachusetts, and has enjoyed an extremely large clientele ever since his graduation from the School of Veterinary Medicine at Harvard University in 1898. He was a member of the A. V. M. A., one of the most active members of the Massachusetts Veterinary Association, and a Mason. He had for years been Chairman of the Arlington Board of Health, and his efficient work in this respect both as an executive officer and in the results of the work of his laboratory had obtained for him state-wide recognition. He was also inspector of animals and milk. His funeral was largely attended by the people of his own city, and it was a noticeable fact that at the time of his funeral the flags on all municipal buildings were at half mast, and practically all the business houses of the city were closed. The respect in which he was held was manifested by the large attendance and by a wealth of floral offerings such as is seldom seen. Representative officers from the entire state were present at the funeral.

J. J. PINK

Dr. J. J. Pink of Oconomowoc, Wis., died of pneumonia February 6, 1917, after an illness of five days.

JAMES G. HOPE.

Dr. James G. Hope, veterinary inspector in the Bureau of Animal Industry, stationed at Union Stock Yards, Chicago, Illinois,

died June 13, 1917. Born in Syracuse, New York, in 1863, he graduated from the Chicago Veterinary College in 1896, and took a post graduate course at the American Veterinary College, New York, from which he was graduated in 1897. He was appointed a Bureau inspector through civil-service examination March 4, 1898, and assigned to duty at Chicago, Illinois. He has been in charge of federal meat inspection at Fort Madison, Iowa, Austin, Minnesota, and Fort Wayne, Indiana, and was assigned to duty at Chicago, January 5, 1914, where he resided until the date of his death.

MISCELLANEOUS

—What We Fight For. The right is more precious than peace, and we fight for the things we have always carried nearest our hearts—for Democracy, for the right of those who submit to authority to have a voice in their own Government, for the rights and liberties of small nations, for a universal dominion of right by such a concert of free peoples as shall bring peace and safety to all nations and make the world itself at last free.—President Wilson.

—At a conference of veterinarians called by Commissioner of Agriculture, C. S. Wilson, at Albany, N. Y., May 18, to consider questions pertaining to the conservation of domesticated animals in the State of New York, the following resolution was passed unanimously:

Whereas, The recently collected statistics show that there is a great decrease in the number of calves, pigs, and poultry that are being raised in this state, and which tends to an alarming situation respecting animal food and meat food products; and

Whereas, Practicing veterinarians are in position to give valuable advice and assistance to animal owners relative to the care and protection of cattle, swine, and poultry that will tend to an increase in the number of these animals; therefore, be it

Resolved, That this conference of veterinarians, called by the Commissioner of Agriculture, recommend and appeal to the practicing veterinarians of the state that they take a more active part in the educational problems pertaining to the raising and conservation of food producing animals and stimulate a deeper interest in the increase of live stock on the farms of the state.

—The Minnesota and Wisconsin Veterinary Associations will hold their summer meeting at Lake City, Minn., July 11, 12 and 13. The Commericial Club and the Ladies' Club of the city are making great plans for the entertainment of the visitors. Ladies are especially invited.

—The Lobeck bill, introduced in the House of Representatives April 13, 1917, is now pending in the House Committee of Agriculture. The bill contains the same provisions for salaries for veterinary inspectors and lay inspectors as were contained in the same bill in the 64th Congress.

—Dr. F. H. Thompson has been transferred from National Stock Yards, Ill., to 326 Federal Building, Salt Lake City, Utah.

—Dr. Walter Fraser has been transferred from El Paso, Texas, to Fort Riley, Kans.

—Dr. R. H. Bussewitz has removed from Watertown to Milton Jct. Wis.

—Dr. Hugh L. Dixon has removed from Regina to Govenlock, Sask.

—Dr. L. C. Pelton has been appointed Inspector in the Dairy & Livestock Department of the State of Washington. He has removed from Enumclaw to Seattle on account of his new duties.

—Dr. A. D. Hubbell has removed from Los Angeles to Rialto, Calif.

—Dr. John Patterson has removed from Manhattan, Kans., to Hedrick, Iowa.

—Dr. G. H. Mydland has removed from Everest to Horton, Canada.

—Doctors John R. Mohler and A. Eichhorn acted as Board of Experts for the discussion of a thesis submitted by Alfred Blumberg, M.Ph., a candidate for the degree of Doctor of Philosophy at a recent examination at George Washington University. The subject of the thesis was "Studies in Immunity with Special Reference to Complement Fixation".

—Dr. F. Gunster has removed from Corvallis to Heppner, Oregon.

—Dr. Guy M. Parrish of Tampa, Fla., a graduate of the Alabama Polytechnic Institute College of Veterinary Science, has accepted an appointment in the French army and has gone to France.

—Dr. A. F. Baldwin, formerly at Creston, Ia., has removed to Rosebud, Montana.

—Do your bit for the Red Cross—also the Blue Cross.

—Dr. A. M. Wright has removed from Emmetsburg, Ia. to Spencer, Ia.

—Dr. T. W. Watson has removed from Kerens to Corsicanna, Texas.

—Dr. Dwight L. Cecil has removed from Windsor to Seymour, Ill.

—Dr. P. E. Johnson, formerly of Dayton, Iowa, is engaged in state work with headquarters at Pierre, South Dakota.

—Dr. A. F. Nelson, formerly of Indianapolis, has removed to Lebanon, Ind., for the practice of his profession.

—Dr. Adam A. Husman has removed from Cincinnati, Ohio to Chicago, Ill.

—Dr. C. V. Noback, formerly located at Otisville, N. Y., has removed to the Bronx, New York City.

—Dr. C. P. Fitch has severed his connection with the N. Y. State Veterinary College at Ithaca to accept the position of Professor of Comparative Pathology and Bacteriology and Chairman of the Veterinary Division in the Animal Industry Group, College of Agriculture, at the University of Minnesota.

Dr. Fitch has established for himself a noteworthy success as a teacher and investigator along pathological and bacteriological lines. He has capably filled the office of Secretary to the N. Y. State Veterinary Medical Society and the Southern Tier Veterinary Medical Association and his loss to the profession in the east will be much regretted.

—Examinations for the regular army veterinary service will be held July 2.

—Attention Ohio. All members of the Ohio State Veterinary Medical Association contemplating attending the meeting in Kansas City are requested to write C. H. Case, Akron, Ohio, 50 E. Buchtel Ave., at once. Very important.

CHARLES E. COTTON

President of the American Veterinary Medical Association

1916-1917

JOURNAL
OF THE
American Veterinary Medical Association

Formerly American Veterinary Review

(Original Official Organ U. S. Vet. Med. Ass'n)

PIERRE A. FISH, Editor **ITHACA, N. Y.**

VOL. LI., N. S. VOL. IV. AUGUST, 1917. NO. 5.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

NORMALITY

We are about to suffer hemorrhages on the field of battle. There will be a disturbance of our general functions because war is abnormal. The alternative of war or dishonor was thrust upon us and there could be but one answer. War, at best, is frightful but when frightfulness is cultivated and encouraged the iron strikes to the inmost recesses of the soul. Against the eternal rock of justice frightfulness must expend its force in vain.

Some lines of business will become hypertrophied, others will become incoordinated and undergo more or less paresis. Business will not be as usual but there will be business. Some lines of businell will progress, others will recede. Serious emergencies cause various reactions. Some react to them hysterically while others maintain their sanity. Hysterics renders confusion worse confounded. Sanity maintains the equilibrium. The inference is obvious. Not only is it a duty but a necessity to keep things moving, to keep sweet and draw upon the reserve of optimism until adjustments can be made. Thrift must be encouraged; waste must be condemned. We are not going to starve, go unclothed nor lose this war. We must "save the waste to win the war". We are at

the training table. We can dispense with unnecessaries in order to win the race. Parsimony has not won for this nation its high place in science, commerce, power or ideals. Let us cultivate vision. Our ideals may be realized by exercising self control. Our habits of thought must change from a local and narrow environment to a vision of the world-wide demands that have come upon us to uphold the principles of democracy and all that we hold dear and to safeguard the future for ourselves and our descendants.

As a result of our disturbed metabolism, some of our scientific and other societies have deemed it advisable "on account of the war" to either cancel or postpone meetings which had been planned. Modern warfare is not altogether a matter of prowess at arms but a stupendous utilization of the various activities that contribute to the life of a nation. Since this coordination is intimate, it is difficult to understand why the various organizations should not hold their meetings. It is not likely that they could escape some reference or consideration of the war, each in its particular field. Individual action is praiseworthy; but concerted or collective action tends to a much greater degree of efficiency. The national government has in no way shown any disposition to discourage such meetings. Other governments have encouraged them. Meetings of scientific societies have always served as a great stimulus to their members and have been a "clearing house" for many of the best thoughts and ideas of our professional men. Just that is needed in our present situation. If a large business corporation depends upon the organized effort and efficiency of the several units and departments, so should our government, now more than ever, look to the collective effort of the various organizations to render suggestions and assistance in solving some of the problems that confront it.

The American Veterinary Medical Association may well be included among such organizations. Veterinarians have duties to perform not merely in the martial field and in the inspection of supplies, but in the broader area of the conservation of the health of our live stock and to assist in providing an abundant supply as needed. Some of the problems, national in scope, have wisely been featured for discussion at the forthcoming meeting in Kansas City. Past meetings have served as a stimulus for much good. The coming meeting should stimulate to greater good and greater effort. Patriotic sentiment alone should augment the attendance. Since

individual effort is weak as compared with organized effort, unattached veterinarians should hasten to join the association and add their weight in the push for greater and more effective results than have hitherto been obtained. To achieve the best we must give the best.

"Then give to the world the best you have
And the best will come back to you."

P. A. F.

EUROPEAN CHRONICLES

POLYVALENT SERUM—The importance of this therapeutic agent is acknowledged by all. As remarked by Leclainche and Vallee in their communication on the specific seral treatment of wounds and their consecutive infections, "the controversies, which have been going on for half a century on antisepsis and its various methods, show the importance of an always open question and the uncertainty of the solutions proposed." Indeed the well known objections to antiseptics and the abuses by which reactions occurred and promoted their proscription, have stimulated research in the great series of microbicide agents, from substances which would kill the microbe while respecting the organic cell or at least without injuring it.

A specific treatment of wounds then presented itself. In the actual stage of our knowledge, two methods of interference are in vogue: vaccination and serotherapy. "The first has difficulties of realization and of uncertainty in its application, it promotes more or less severe organic reaction and its action is but limited. On the contrary, serotherapy carries with itself, already elaborated, the immunizing substances; its immunity is absolute and its effects immediate."

The general principle of serotherapy is known. The introduction in an organism of certain "bodies" microbes or toxins for instance, gives rise to a vital reaction, which promotes the formation of other substances (antibodies) able to influence *in vitro* and neutralize *in vivo* the elements which have promoted their elaboration.

The serum brings to the treated animals the antibodies which will permit them to resist the microbes and their toxins. This protection takes place through the medium of the organic cells

which seize and digest the microbes and remain indifferent to the toxins. (*Phagocytosis.*)

Applied to the treatment of wounds and the prevention of their complications, serotherapy must have in view not one pathogenic agent but a series of microbes. It must be polyvalent, its many values correspond to the various agents that may be possible in an infection.

It is then that polyvalent serotherapy is specific. It gives perfect results only when used against the infections corresponding to its various values.

Such is the polyvalent serum of Leclainche and Vallee. Prepared by the immunization of horses against the pyogenic microbes, most frequently observed, it is in principle reserved for the treatment of local or general accidents produced by ***strepto-cocci, staphylococci, septic vibrio,*** and ***Bacillus perfringens*** which are utilized in its preparation.

In the treatment of lesions due to other pathogenic agents, (ulcerous or epizootic lymphangitis, necrotic accidents, connected with the evolution of the bacillus of Bang, suppuration of strangles, etc.) the polyvalent serum of Leclainche and Vallee acts only indirectly in proportion to its physiological qualities and its specific action upon the pyogenic elements associated with the specific forms. Its action, still existing, is however less complete than in the other cases.

Referring to this serum, the authors continue in the ***Revue Generale*** as follows: "The success of the medication depends also, and in all circumstances, on the method of application. The essential conditions of the technic of the seral dressing are important.

The use of the serum is exclusive of that of antiseptics, which, besides the coagulating and neutralizing action produced by some of them, have the objection, nearly always, of depressing and paralyzing organic cells, an action essentially antagonistic to that which is demanded of the serum.

Deposited on the surface of an aseptic wound the serum constitutes an ideal dressing, identical with its physical and chemical properties to the exudation of plasma and it constitutes an efficacious protection against threatening invasions. Applied on an infected wound, it manifests its specific properties in promoting a series of phenomena more or less apparent, which indicate the activity of the cellular defense.

Injected under the skin, in threatening infections or one already invading, it promotes the lowering of the temperature and an improvement in the general condition.

The use of the serum demands its contact with the anatomic elements, hence the necessity to free the wound of the various elements which cover it. Careful washing with boiled water, preferably a normal salt solution at 9 p 1000, is desirable. With this, the action of the serum will be realized. The region should be constantly kept, by excision or curettage, in the most favorable condition for the local action, in contact with the serum. Its cicatrizing properties permit of the most extensive surgical action.

If used under these directions the polyvalent serum will give excellent results as have already been confirmed and recorded by many reports. These are found in human and veterinary journals where many cases are published and from which I will present a few instances in a later article.

VETERINARY PRESS—Is it not surprising how many of our confreres are careless or indifferent to the organs of their profession, at least generally speaking? Is it not also astonishing that the history of the press, essentially veterinary, is neglected? One knows that such a paper is produced monthly, that another is offered to the public weekly, that a Review, general or partial, is issued at various times, but that is all. Of course, from the point of view of the daily practitioner that is all that is necessary to know; but would it not also be advantageous to know when, where and what are the publications which refer to our practice, and where they are to be found, looked into and, so to speak, dissected for the numerous interesting items of information they contain?

A general history of the veterinary press would be almost one of the entire profession down to our day. Who will write it? Who will follow the example already started by Major General F. Smith, C.B., C.M.G., F.R.C.V.S., who in the *Journal of Comparative Pathology and Therapeutics* has presented in several numbers of this excellent journal his brilliant article on *The Early History of Veterinary Literature and Its British Development?* Such a work makes a handsome addition to the literature of veterinary medicine.

These remarks were suggested to my mind by the article of

Major General Smith as well as by an editorial of the *Veterinary Journal* of February, 1917, where a history is given of that publication from its birth to the present time.

The *Journal,* if I am not mistaken, is the oldest existing periodical in England. Those who, like me, remember the *Veterinarian* and its long life will always remember it as a souvenir of its welcome monthly appearance. It died. Its long life history would be pleasant to look into. In age the *Veterinary Journal* has taken its place; but the *News,* the *Record* have begun also to add some years to their age and here is a new comer, the *Review.*

England can furnish a good chapter to the history of the veterinary press of the whole world.

Am I to speak of what is published in France, where the *Recueil* alone numbers its present volume in the 93rd year (XCIII)?

What can be said of Italy with her numerous journals on veterinary medicine, of Russia, Spain, Belgium, Germany, in fact of every country of Europe where our profession is a science as well as an art?

And again the United States. This country perhaps has been the last coming into the field and yet it can offer a big share as a contribution to our professional press.

I may be starting a nonsensical idea, but I only regret that age and a peculiar condition of health and life will not permit me to undertake the work.

At any rate the article of the *Veterinary Journal* to which I have alluded is, I consider, a beginning in the right direction and I have no hesitancy in extracting from it for the curiosity and satisfaction of our readers.

The article is presented as an introduction to the 500th number of the *Journal.* It says: "The *Veterinary Journal* first made its appearance in 1875, under the editorship of George Fleming, C.B., LL.D., F.R.C.V.S., who became Principal Veterinary Surgeon of the British army with the rank of General. On his death in 1894 he was succeeded by William Williams, F.R.C.V.S., F.R.S.E., Principal of the Royal Veterinary College of Edinborough. In 1900 Prof. Owen Williams, F.R.C.V.S., F.R.S.E., became subeditor and assumed the whole editorial responsibility when his father died. He subsequently moved to Liverpool and took an important share in founding the veterinary department of the University. In 1903 Colonel J. A. Nunn, C.B., D.S.O., F.R.C.V.S., F.R.S.E.,

joined him as sub-editor. When Owen Williams died in 1905, he was succeeded by Frederick Hobday, F.R.C.V.S., F.R.S.E., who still edits the *Journal*. On the death of Colonel Nunn in 1908, Prof. G. H. Wooldridge, F.R.C.V.S., was appointed sub-editor and remained in that post for several years. In September 1906 Doctor W. L. Williams of the New York State Veterinary College joined the editorial staff as editor for the United States. In 1910 Mr. J. A. Gilruth, M.R.C.V.S., F.R.S.E., became editor for Australia.

In 1912 Prof. Woodruff succeeded Prof. Gilruth, resigned. In 1913 Prof. Wooldridge resigned and since then Professor Hobday has had the sole charge of the editorship of the *Journal* and while he is at the front during the war he is assisted by Mr. Gladstone Mayall, M.R.C.V.S.

THE HISTORY OF MALLEIN. The *Veterinary Record* has a leading article on the subject, referring to what could be written for England. The facts alluded to are full of interest, concise as they are, and yet one is struck by the necessity of governmental recognition in a question of that importance. This recognition was very late coming to England and one can, with the writer of the article, ask what would have happened and what amount of money would have been lost, had the mallein test been ignored by Great Britain.

Although the official introduction of mallein, by governmental order in England, was difficult to obtain, notwithstanding the great effort made by some of her veterinarians prominent in the profession, it must be remembered that this was not a privilege of that country.

Mallein met with obstacles and restrictions in Central Europe also and it took some time after its discovery in Russia in 1891, before it reached other parts of Europe. Its superior qualities were disputed and even by some whose high qualifications ought to have made them wiser and better judges.

However, by the work of many, this state of affairs has changed and there no longer exists any doubt relative to the essential necessity of submitting solipeds to the mallein test when looking for or guarding against the possibilities of a latent form of glanders.

The extensive recorded tests made by Drouin in Greece and in France and those of Hobday of England have proved the intra-dermo-palpebral method, an operation so certain and of such simplicity that the number of unbelievers has, I dare say, completely

subsided. If the history of mallein is ever written, I imagine that no one would ever dare to say that once he doubted its useful qualities.

According to an editorial of the *Record,* we find it recalled that it was through Sir John M'Fadyean that in 1892 the mallein test received, in England, its first introduction, when this gentleman was appointed to the staff of Camden Town. From that moment London practitioners joined in the movement and recognized the value of the new agent. Yet official governmental recognition did not support the great results obtained, and it was not until 1907 that the government recognized the test and issued the general orders on glanders.

There is no doubt that the history of glanders, previous to and since the introduction of the mallein test would prove most interesting and that a valuable document could be produced. When one considers that by mallein, the veterinary profession has in its hands one of the strongest means of controlling glanders and considering the grand success that has been obtained in the present time of war, so favorable to the spreading of the disease, it seems impossible to admit that the day will not soon come when glanders, like a few other contagious diseases, will be one of the past.

CHLORAMINE. Based upon their experience in many cases, Drs. Desplas and Policard have called the attention of surgeons to the use of this valuable antiseptic with which they have obtained excellent results. In an article in the *Presse Medicale* they have presented their reasons.

The action of hypochlorites in an infected wound includes two processes: 1st, fixation of the hypochlorite upon the albuminoid elements and formation of a new body, a chloramine, a kind of organic hypochlorite; 2nd, the chloramine thus formed possesses a strong antiseptic action, well studied by Dakin and Cohen.

When an hypochlorite is made to act on a wound, it is partly by the chloramine that the bactericidal action takes place.

Therefore to avoid the dissolution of the tissues of a wound it is extremely advantageous to utilize not the hypochlorites, but the chloramine which has no dissolving action.

On this rests the indication for the clinical use of chloramine. The *paratoluene sodium sulfochloramine*, which was discovered by Chattaway and is generally known *simply* as *chloramine* is a white

powder formed of little plates, having an odor of chlorine gas, easily dissolved in cold sterilized water, and can be mixed with any fatty substance. In solution of 1.5% in sterilized water, it shows a much greater antiseptic power than any hypochlorite and has a much less irritating action. Stronger solutions, however, irritate the integument considerably.

Such a solution has no dissolving action on the muscular or aponeurotic tissues and, while under treatment, these preserve their anatomical appearance for four or five days, until granulations are formed.

The solution is used in two ways: for flat superficial wounds a moist dressing is employed, first covered with sterilized gauze, this is sprinkled with the solution of chloramine and the dressing is completed with a sponge-cloth or hydrophile or ordinary compress. The dressing is renewed every 24 hours at first, then 48 hours after the third day.

For deep wounds the solution is used in instillations every three hours. For very superficial wounds an ointment is used.

Chloramine has no dissolving action on the tissues. This is an essential character but it has its advantages and its inconveniences. When there is no necrotic process going on, its sterilization takes place very rapidly and the secondary repair goes on after six or seven days. If on the contrary the necrotic process is extensive, the chloramine jugulates the infection but the myolysis takes place by autolysis, which is a slow process. It is necessary to resort to the mechanical excision of the necrosed tissues.

Fresh wounds treated primarily with chloramine *do not suppurate*. In old suppurating wounds, in three or four days, the suppuration stops or is reduced rapidly, and providing all foreign bodies have been removed, the granulating process takes place also very rapidly. The granulations which were at first pale, infiltrated and bleeding easily, soon become of a good character and progress towards cicatrization.

Alcohol for Cleaning the Hands. Is alcohol a superior agent for the washing of the hands of a surgeon preparatory to an operation?

On this question an interesting controversy has been started and articles have found their way in the medical papers. The

critics differ and refute justification of the use of alcohol for the disinfection of the surgeon's hands. Among many the following has appeared in the *Presse Medicale* relating to some points of importance claimed for it as making it an efficacious, simple and rapid mode of disinfection.

Is alcohol the most efficacious among the antiseptics and microbicides for the asepsis of the skin? For many the ideal antiseptic is yet to be found. Successively a great number of substances have been proposed and among them alcohol; but the microbicide properties of that substance and its manifest superiority have to be established. It has been said that alcohol at 100° has a bactericidal and antiseptic power more developed than alcohol at 90°. To oppose that statement it may be remarked that it is generally admitted that alcohol at a degree inferior to 90 was more microbicidal. It is a known fact that diluted alcohol is more extensively used by surgeons in our day. More than that, it is already in disuse by many who prefer to resort only to alkaline solutions in preference to any alcoholic preparation.

As to the simplicity of its use, it does not seem to be superior to the method where other antiseptic preparations can be resorted to in preference to a costly liquid and which is not without danger.

As to the rapidity of the disinfection to be obtained, it is a question which can only be realized if alcohol is the most efficacious antiseptic and microbicidal agent, which is to be demonstrated.

While waiting for more complete and comparative experiments, alcohol cannot be considered as possessing any qualities superior to other antiseptics for the disinfection of the hands of surgeons and that no one would abandon soap and water for it. Certainly surgeons who use rubber gloves will not discard them for an alcoholic scrubbing.

BIBLIOGRAPHY. In the April number of the *Journal*, our worthy editor and friend Dr. Fish has already announced the arrival of a new monthly in England, the *Review*, published by the Principal of the Royal Veterinary College (Dick).

I am sure a word on it in the European chronicle is in order.

I have seen only the second, the May, number and a careful examination tells what the *Review* intends to be and what the volume will accomplish at the end of the year.

This number has first an article on *Specific Polyarthritis* by William Brown, M.R.C.V.S. Then come the abstracts. These form

the *Review.* They are divided into chapters, anatomy, dietetics, general, historical, hygiene and preventive medicine, infectious diseases, medicine, methods, parasitology, pathology and bacteriology, poultry diseases, serology and immunology, surgery, teratology, toxicology, tuberculosis.

After the abstracts comes the chapter of reports followed by the reviews and notes on books.

The number closes with a bibliographic list of many papers on almost all the subjects considered in the chapters.

A somewhat similar work was inaugurated several years ago in France by the well known publication of Leclainche and Panisset. It met with success and it is certain that the new *Review* will obtain one equally great. If, as I hope it will, the *Review* extends its work among the publications, which are temporarily arrested on account of the war, then our friends who are English readers will certainly find the work of Dr. Bradley one of the most valuable additions to our literature.

SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

JOURNAL OF COMPARATIVE PATHOLOGY AND THERAPEUTICS.—(March) Early history of veterinary literature and its British development (continued). On a tick-borne gastro-enteritis of sheep and goats in British East Africa. Tuberculous mastitis in cows—pathogenesis, morbid anatomy and histology. Sarcoptic mange in the ox. Tuberculosis in camels.

VETERINARY JOURNAL. (April). Glanders and the British army. Early history of the veterinary profession in Victoria. (O) Case of splenic abscess due to Spiroptera Megastoma. (O) Caesarian section in a Brahman heifer.

VETERINARY JOURNAL (May). Remarks on the surgical treatment of quittor. Graphic method of recording lameness. (O) Interesting case in a foal. (O) Canine, feline and porcine cases.

VETERINARY NEWS. (O) Paralysis of anterior crural and radial nerves. Canker of the foot and its treatment. Points on pig practice. (X) Presence of tubercle bacilli in the fèces of cattle in dairy herds.

VETERINARY RECORD (April). (O) Interesting case of fracture of the os coronae. Treatment of respiratory diseases by intra-tracheal injections of formalin. Surgical conditions encountered in canine practice. Equine sarcoptic scabies in the mouse. (O) Anomaly of a valve in the heart of a horse.

BULLETIN DE LA SOCIETE CENTRALE. On the treatment of distomatosis. Symptomatology of epizootic lymphangitis. (X) Treatment of wounds with polyvalent serum. (O)Observations cliniques. (O) Severe traumatism of the neck.

Revue Generale de Medecine Veterinaire. (X) Notes on the operation of Williams. On the treatment of tetanus.

Revue de Pathologie Comparative. On artificial emunctories.

Clinica Veterinaria (April). Rabies and hemorrhagic septicemia in cattle. Intratracheal injections of alcoholic creosote in the treatment of pneumonia of horses.

Il Nuovo Ercolani. Glucosed serum in intratracheal injections in over worked horses.

Bulletin 85—*University of Nevada.* The use of bacterin in the control of fowl cholera.

A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

—Franco-Belgian Veterinary Relief Fund. The Southern Tier Veterinary Medical Association, at its last meeting in Elmira, N. Y., appropriated fifty dollars for this fund.

—A valuable bulletin by Doctors Dalrymple and Flower has recently been issued by the Louisiana State Live Stock Sanitary Board. It is entitled "Thirty-eight Questions and Answers Concerning Charbon or Anthrax."

—The fourth annual convention of the National Association of the Bureau of Animal Industry Employees will be held at Omaha, Neb., in the Hotel Rome, Monday, August 13. The Omaha branch is making elaborate arrangements for the entertainment of the delegates.

—A meeting of the Association of State and Provincial Veterinary Colleges is scheduled to be held at Kansas City, Mo., August 19th, the day preceding the opening of the meeting of the A. V. M. A.

—The members of the Kentucky Veterinary Medical Association were entertained by Doctors M. A. Purdy and J. K. Ditto with a very elaborate banquet at the meeting held June 20 and 21.

—It is reported that the flesh of goats, horses and mules have been added to the meats that may be sold for foods in Pennsylvania.

—First Lieutenant Dr. D. B. Leininger, formerly stationed at Douglas, Arizona, is now located at Fort Bliss, Texas.

—The next meeting of the Colorado Veterinary Medical Association is scheduled for January, 1918.

THE ETIOLOGY OF HOG CHOLERA

(SECOND REPORT)

FREDERICK PROESCHER, M.D., AND HARVEY A. SEIL, Ph.D.
Pittsburgh, Pa.

In a previous paper in this *Journal* we described a small coccus found in the blood and urine of pigs affected with hog cholera. This organism was made visible both substantively and adjectively with methylene azure carbonate. It was found in the desquamated endothelial cells circulating in the blood stream, in the leucocytes and also attached to the red cells as well as extracellular. The minute size, staining properties and localization of these microorganisms pointed to them as the probable causative agents of hog cholera. The organisms are differentiated from mitochondria which exhibit the same staining properties and in the granular form closely resembles them by their uniform size and peculiar affinity for the red cells. Their cultivation *in vitro* absolutely classifies them as microorganisms.

This paper is concerned mainly with the blood changes, continued studies on the staining properties of the virus, the microscopical changes in the organs and the cultivation of the organism.

The blood changes occurring in hog cholera was investigated with twelve pigs. The virus used in these experiments was obtained from highly virulent hog cholera blood. The undiluted centrifuged serum was filtered through a Chamberland filter F. Eight of the twelve pigs were infected intramuscularly with filtered hog cholera serum. The remaining four were kept in the same stable with the infected animals to become infected spontaneously. From the eight pigs infected, pig 7 died spontaneously on the twelfth day. Pigs 5, 6, and 8, were killed in agony on the 15th, 13th, and 14th day respectively after inoculation. Pigs 9, 10, 11, and 12 acquired hog cholera spontaneously. Pig 9 died after 12 days, 10 was killed in agony on the 15th day, and 11 and 12 recovered.

The postmortems of the pigs showed the typical lesions of hog cholera. Several hundred cultures were made from the blood and different organs. Three of the pigs were secondarily infected with *Bact. suipestifer*, two with *Bact. suipestifer* and *suisepticus* and one was a pure hog cholera infection.

The following tables show the absolute leucocyte count and the differential count before and after infection.

TABLE NO. I.

BLOOD COUNT BEFORE INOCULATION.

March 7th, 1917	Pig 1	Pig 2	Pig 3	Pig 4	Pig 5	Pig 6	Pig 7	Pig 8	Pig 9	Pig 10	Pig 11	Pig 12
Absolute Leucocyte Count	37,500	12,000	20,125	37,500	28,750	18,125	28,410	27,625				
Differential Count Poly-Neutrophiles	41.1%	61.00%	46.4%	34.7%	59.66%	22.50%	32.10%	46.50%	36.00%	46.30%	43.00%	47.60%
Poly-Eosinophiles	3.0%	2.33%	4.7%	2.6%	2.00%	17.00%	1.60%	3.00%	1.50%	2.30%	4.30%	1.60%
Poly-Basophiles	.3%	1.00%	.5%	1.6%		3.60%	.50%	1.90%	1.50%	.50%	1.20%	1.10%
Small Lymphocytes	55.2%	35.00%	47.0%	60.1%	38.00%	56.70%	65.70%	48.00%	61.00%	50.90%	51.50%	49.60%
Large Lymphocytes			.5%									

BLOOD COUNT AFTER INOCULATION.

March 15th, 1917	Pig 1	Pig 2	Pig 3	Pig 4	Pig 5	Pig 6	Pig 7	Pig 8	Pig 9	Pig 10	Pig 11	Pig 12
Absolute Leucocyte Count	12,000	12,000	15,500		7,500	5,000	14,000					
Differential Count Poly-Neutrophiles	54.50%	42.63%	23.68%	44.85%	64.65%	64.10%	72.50%					
Poly-Eosinophiles	.50%		2.46%		.46%	.93%						
Poly-Basophiles	1.00%		.41%		.92%	.41%						
Large Lymphocytes	.15%						1.00%					
Medium Lymphocytes	10.00%	1.93%	6.17%		.72%	8.87%						
Small Lymphocytes	33.50%	53.65%	67.07%	55.14%	33.02%	25.70%	26.50%					
Neutrophile Myelocytes												
Plasma Cells												

Table No. II.

Blood Count After Inoculation.

March 19th, 1917	Pig 8
Absolute Leucocyte Count	10,000
Differential Count Poly-Neutrophiles	48.23%
Poly-Eosinophiles	.47%
Poly-Basophiles	1.91%
Large Lymphocytes Medium Lymphocytes	6.22%
Small Lymphocytes	36.00%
Neutrophile Myelocytes	.95%
Plasma Cells	.47%

March 20th, 1917	Pig 6
Absolute Leucocyte Count	12,500
Differential Count	
Poly-Neutrophiles	66.33%
Poly-Eosinophiles	.46%
Poly-Basophiles	.46%
Large Lymphocytes	6.33%
Small Lymphocytes	6.33%
Medium Lymphocytes	10.52%
Neutrophile Myelocytes	10.04%
Plasma Cells	.46%

Table No. III.

Blood Count After Inoculation.

March 21, 1917.	Pig 2	Pig 4	Pig 5	Pig 11	Pig 12
Absolute Leucocyte Count			47,500		10,000
Differential Count Poly-Neutrophiles	42.63%	41.66%	46.36%	46.50%	50.86%
Poly-Eosinophiles		1.00%			.87%
Poly-Basophiles		.33%			.43%
Large Lymphocytes		.66%			
Medium Lymphocytes	1.93%		.45%	1.00%	
Small Lymphocytes	53.65%	56.33%	50.00%	26.00%	47.82%
Neutrophile Myelocytes	1.91%		3.18%	10.05%	
Plasma Cells				16.00%	

March 22, 1917	Pig 10
Absolute Leucocyte Count	41,000
Differential Count Poly-Neutrophiles	65.44%
Poly-Eosinophiles	
Poly-Basophiles	
Large Lymphocytes	15.20%
Medium Lymphocytes	7.80%
Small Lymphocytes	14.17%
Neutrophile Myelocytes	5.70%
Plasma Cells	.50%

These blood counts cannot be regarded as conclusive on account of their incompleteness. The lack of proper working facilities and the remoteness of the stable from the laboratory prevented daily blood counts and the destruction of samples in transport to the laboratory resulting in the loss of valuable data necessitates a repetition of the above work. The tables show that in hog cholera there is at first a decrease in the absolute leucocyte count. In some of the pigs 5 and 6 a leucopenia was observed. Shortly before death there may be a considerable leucocyte increase. (Pig 10, 41,000, pig 5, 47,500). In the majority of the cases the differential count showed a decided increase in the polynuclear neutrophiles, with a decrease in the lymphocytes. The polynuclear eosinophiles and basophiles are greatly diminished in number or disappear entirely. Neutrophile myelocytes and plasma cells may appear shortly before death. If the increase in leucocytes just before death is occasioned primarily by the hog cholera virus or is due to a secondary infection with *Bact. suipestifer* or *suisepticus* cannot be determined. Both pigs showing a high ante-mortem leucocyte count where secondarily infected with *Bact. suipestifer.*

The numerous blood smears obtained from infected pigs gave opportunity for a more extended study of the staining properties of hog cholera virus. The single staining with methylene azure carbonate after fixation with either methyl alcohol or vanadium or uranium salts is without doubt the best method for demonstrating the virus in the different cellular elements of the blood. Previous experience has shown that staining with methyl alcohol solution of eosin—methylene blue—toluidine blue (2) for three minutes either alone or followed by diluted Giemsa solution for 15 minutes gave negative results. Endothelial cells were not made visible. A differential staining method would be of great value to distinguish the virus from mitochondria. In staining some hog cholera smears by the above method, in several which were accidentally exposed for 16 hours in a diluted slightly alkaline Giemsa solution, huge masses of virus attached to the red cells as well as extra cellular masses were rendered visible. Groups of red cells were densely covered with a deep-blue stained virus. Single cocci could be seen both on the edges and between the red cells. A careful examination of these smears showed no mitochondria with the exception of some very faintly stained occurring in a few endothelial cells so little tinted as to be just about visible. This method of staining

therefore affords a differentiation between the virus and the granular forms of mitochondria which might be mistaken for the microorganism by the inexperienced observer. In brief the staining method is carried out as follows: the air-dried smears are stained in a methyl alcohol solution of eosine—methylene blue—toluidine blue for three or four minutes, immersed for a few seconds in 96% alcohol, washed in water, superficially dried and then floated for 16 hours on a diluted Giesma solution (1 to 10) alkalized with 2 drops of 1% sodium carbonate or borax solution to 10 c.c. The smears are thoroughly washed in running water, air dried and then mounted in cedar oil or better in paraffin oil. This method is superior to the simple methylene azure carbonate staining for the demonstration of the virus attached to the red cells. The virus in the endothelial cells, however, is not made visible. Theoretically, the acid eosine probably acts as a mordant for the virus and only very slightly for the mitochondria.

While the gross pathology of hog cholera is well known very little attention has been given to the microscopic changes. Macroscopically very important changes to which sufficient prominence has not been given in the past occur in the lymphatic-lienal system. As might be expected from the similarity of hog cholera to typhus fever, constant changes in the brain are found, showing congestion of the pia-arachnoidea, multiple small hemorrhages of the brain substance and encephalitic changes. A more detailed report on both the macroscopic and microscopic changes will be published later since certain interesting findings necessitate further study with a different fixative before a complete report can be rendered.

A summary of the histological findings show that the most pronounced changes are found in the lymphatic system and spleen. The inflammatory reaction in both is of a pronounced plasma cellular character. The polynucleosis is almost absent. The plasma cell infiltration is noted throughout the lymphatic system and spleen. The plasma cells are of lymphocytic origin. The proliferation of the endothelial cells diffuse and circumscribed in both the lymph glands and spleen with a tendency to fibrous induration is characteristic. Congestion, edema, hemorrhages and siderosis are of common occurrence. Endothelial cell necrosis in both lymph glands and spleen is often noted. A pronounced perivascular infiltration is found in almost all the organs and cutis. Cellular infiltration is of a plasma-cellular and of a lymphocytic character.

The brain shows typical encephalitis and multiple hemorrhages into the brain substance. The liver shows congestion, cyanotic atrophy, sometimes diffuse hepatitis, cloudy swelling and siderosis. The kidney shows pronounced glomeruli nephritis, congestion, hemorrhages in the cortex and pelvis. The myocardium shows localized round cell infiltration, hemorrhages and cloudy swelling of the muscle fibres. A marked proliferation of the endothelial lining is seen throughout the vascular system.

For the cultivation of the virus both the blood and the organs of the six pigs which succumbed to hog cholera were used. The pigs which were killed in agony were bled and the blood collected aseptically. It was defibrinated, centrifuged and the serum filtered through a Berkfeld filter V. The filtrate was first tested aerobically and anaerobically for common bacterial contamination. Only perfectly sterile serum was used for culture purposes. Unfiltered sterile carcinomatous ascites and sterile unfiltered horse serum were the culture media used. Either was filled into sterile test tubes to which a piece of fresh kidney or liver tissue from a guinea pig or rabbit was added and covered with sterile paraffin oil. The tubes so prepared were incubated for a week at 37°C. Cultures were made from each tube, aerobically and anaerobically in plain bouillon and grape sugar agar to insure complete sterility. To the sterile culture tubes filtered hog cholera serum equal in amount to the culture medium was added by means of a sterile pipette. In one case, in which the blood taken directly from the heart with a syringe proved to be sterile the undefibrinated blood was added directly to the culture medium. Cultures were also made by filling the filtered hog cholera serum into test tubes adding a small piece of fresh guinea pig liver. These were kept under anaerobic conditions in a Novy jar.

Cultures were made by taking pieces of organs aseptically removed from the dead animal and immersing them in unfiltered sterile carcinomatous ascites or unfiltered sterile horse serum and then covering with sterile paraffin oil. The majority of the organs were secondarily infected and the cultures which showed marked infection were discarded. Those which were but slightly contaminated, after incubation for a week, were filtered first through filter paper and then through a Berkfeld filter V. The filtrates so obtained were used for subcultures as described above.

Changes in the appearance of the otherwise bacterially free culture are but slight. After two to three weeks the culture medium shows a slight opalescence which gradually disseminated throughout the liquid. In cultures made from filtered virus with the addition of a piece of fresh tissue a growth is observed in four weeks. In others, however, where the presence of cocci was demonstrated microscopically hardly any change in the culture medium could be noted.

Several hundred cultures prepared as just described, after three or four weeks incubation were examined microscopically and cultures made in the common culture mediums both aerobically and anaerobically. Grossly contaminated cultures were rejected. For the microscopical examination one to two c.c. of the culture was diluted with normal sterile salt solution to 10 to 20 c.c. and centrifuged. Smears were made from the sediment and stained in the usual way after Gram or with carbol fuchsin or methylene azure carbonate. Of all the cultures but four percent showed the small cocci found in the blood stream. The greatest percentage of cultures was obtained from those made with unfiltered blood. Only the lymph glands of the organs used, yielded positive cultures. Positive cultures were also obtained from the filtered serum alone with addition of fresh tissue under anaerobic conditions.

The growth in the primary cultures is not very abundant and consists of small isolated cocci or diplococci or agglomerated masses of cocci. They are Gram negative and their size is just on the limit of microscopic visibility. After decolorization with alcohol acetone at least a half hour is necessary for a distinct staining with carbolfuchsin. The Gram fuchsin method of staining is more satisfactory than the methylene azure carbonate method since the latter allows no sharp differentiation of microorganisms from the granular detritus of the sediment. Subcultures made on the same culture medium with the addition of a piece of fresh tissue show a very slight growth only in plain ascites, or ascites mixed with an equal part of glucose bouillon, or in horse serum or horse serum mixed with an equal part of glucose bouillon a very slight opalescence is noted after eight or ten days incubation. Thus far the third subculture has been obtained. On solid culture media, glucose ascites agar, both aerobically or anaerobically no growth was obtained. The filtered cultures either from ascites or horse serum with or without the addition of grape sugar

bouillon on inoculation yielded subcultures. These last experiments prove that the cultures contain a filterable actively growing virus.

This investigation confirms our previous microscopic findings demonstrating the same microorganisms in the blood of hogs innoculated with filtered hog cholera virus. With a modified staining method it was possible to demonstrate huge masses of microorganisms attached to the red cells corroborating the earlier biological experiment of K. F. Meyer, ([3]) who showed that the hog cholera virus tenaciously adhered to the red blood cells and also demonstrated that it was impossible to remove the virus from the red blood cells by repeated washings with normal salt solution followed by centrifuging. He further showed that the addition of normal red cells from the rabbit and guinea pig will also precipitate the virus from serum, but it can be partially removed by washing with normal salt solution.

It was possible to grow microorganisms both from the filtered and the unfiltered blood as well as from the organs in the form of a minute Gram negative coccus which has the same morphological habitus and the same biological properties as that found in the blood stream.

As soon as sufficiently distant subcultures are obtained such that the transmission of the original virus is absolutely excluded, animal experiments will be made to furnish conclusive proof that this organism is the causative agent of hog cholera.

LITERATURE

1. F. Proescher and H. A. Seil. The Etiology of Hog Cholera. *Journal of the American Veterinary Medical Association,* April, 1917.
2. F. Proescher. Zur Bluttärbetechnik. *Centralblatt für Allgemeine Pathologie and Pathologische Anatomie.* Band. XVI 1905.
3. K. F. Meyer. Filterable Viruses. *American Veterinary Review,* 1914.

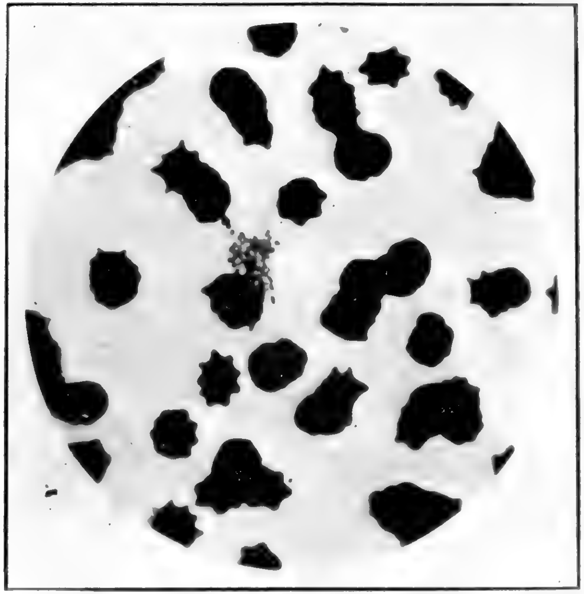

FIGURE 1—Smear—Hog Cholera Blood—showing extracellular virus - combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

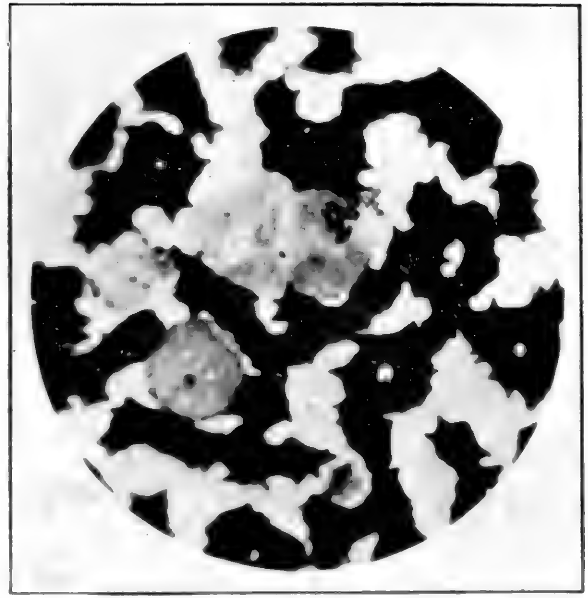

FIGURE 2—Smear—Hog Cholera Blood—showing virus both in the protoplasm of a polynuclear leucocyte and also extracellular combined staining. Proescher-Giemsa. Leitz Oc. 4. Oil immersion 1/12.

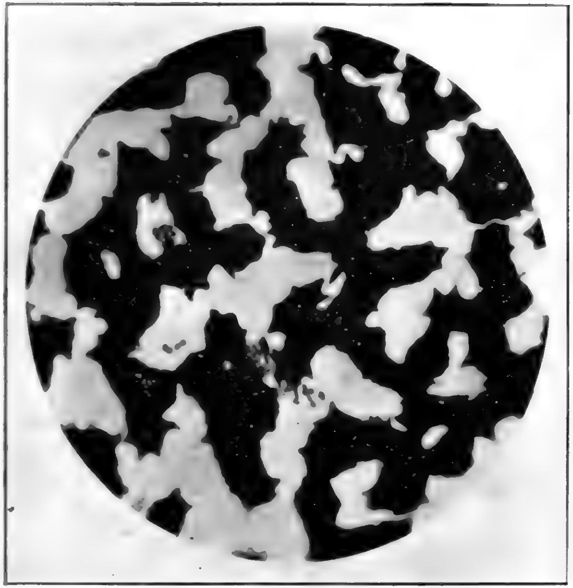

FIGURE 3—Smear—Hog Cholera Blood—showing extracellular virus—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

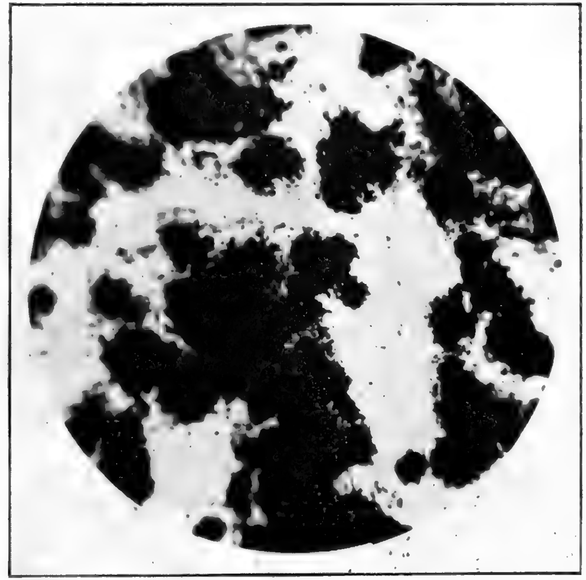

FIGURE 4—Smear—Hog Cholera Blood—showing huge masses of virus attached to red cells—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

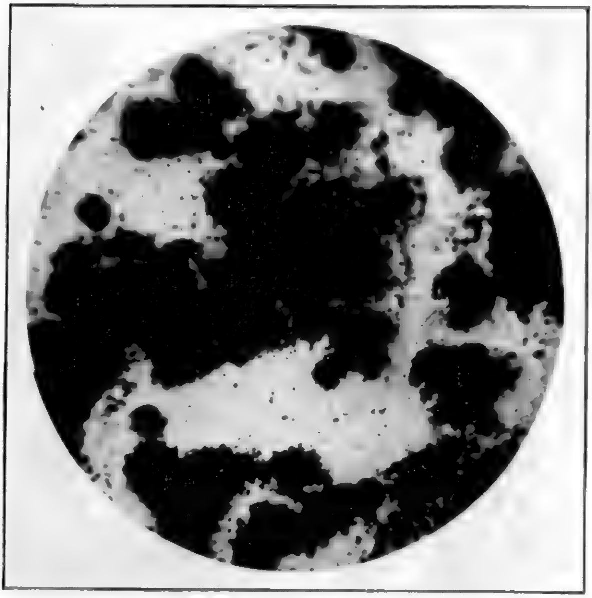

FIGURE 5—Smear—Hog Cholera Blood—showing huge masses of virus attached to red cells—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

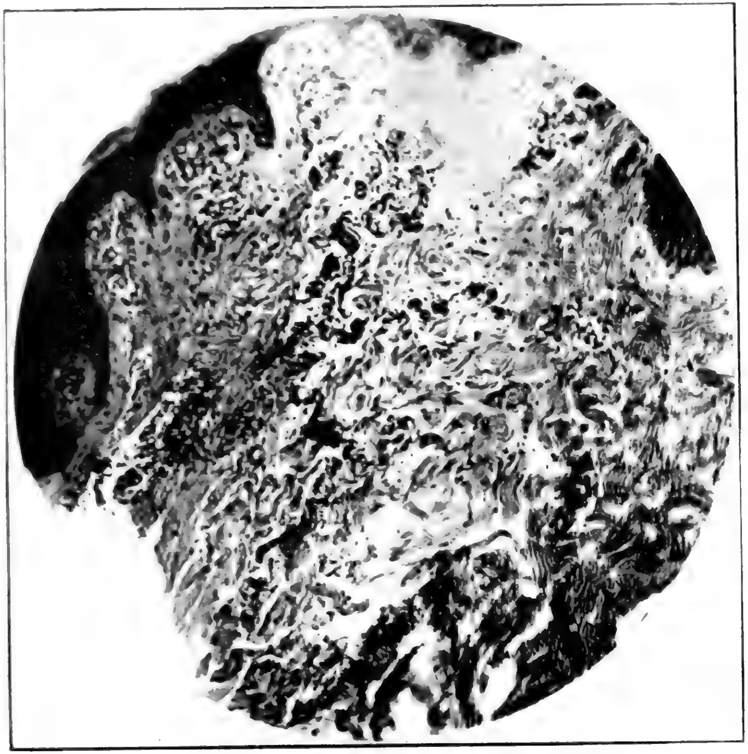

FIGURE 6—Cutis (abdomen) showing perivascular infiltration of the capillaries of the papillary layer and corium (van Gieson). Leitz Oc. 2. Obj. 4.

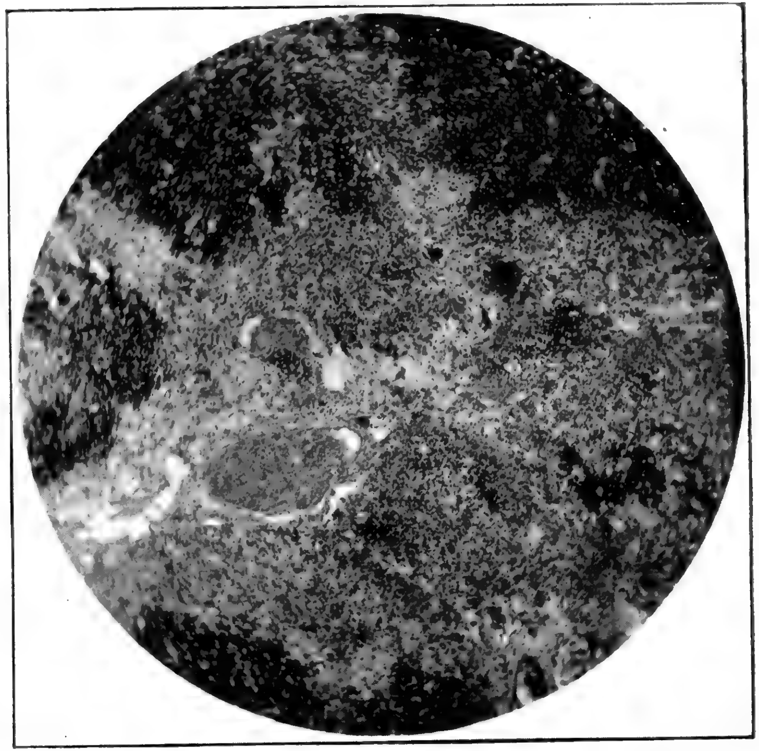

FIGURE 7—Mesenteric lymphgland—showing congestion, proliferation of endothelium cells and plasma cell infiltration. (eosin-hematoxylin) Leitz Oc. 2. Obj. 3.

FIGURE 8. Mesenteric lymphgland showing circumscribed and diffuse proliferation of endothelium cells and plasma cell infiltration. (methylgreen-pyronin). Leitz Oc. 2. Obj. 4.

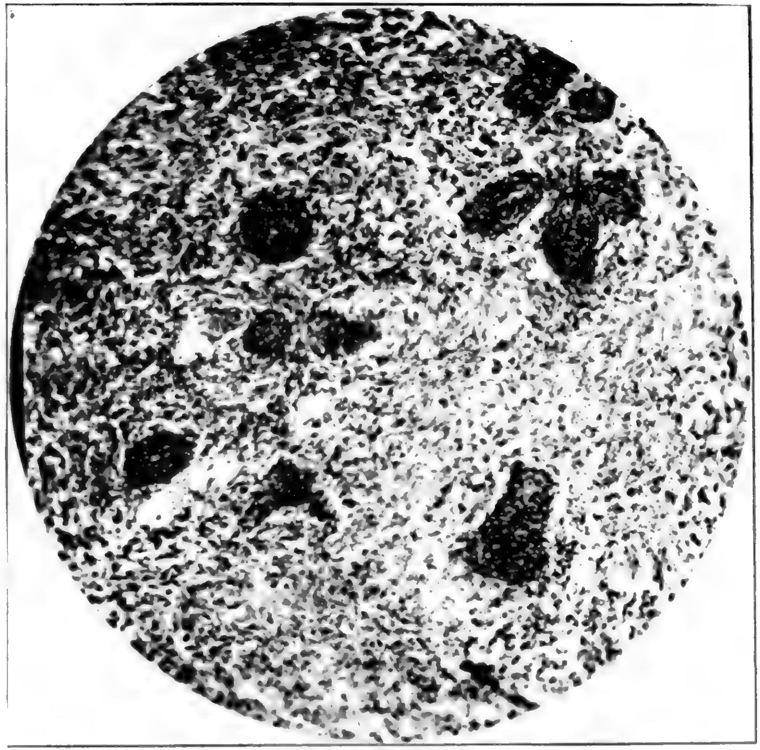

FIGURE 9. Spleen showing circumscribed proliferation of endothelium cells and plasma cells infiltration. (methyl-green pyronin). Leitz Oc. 2. Obj. 4.

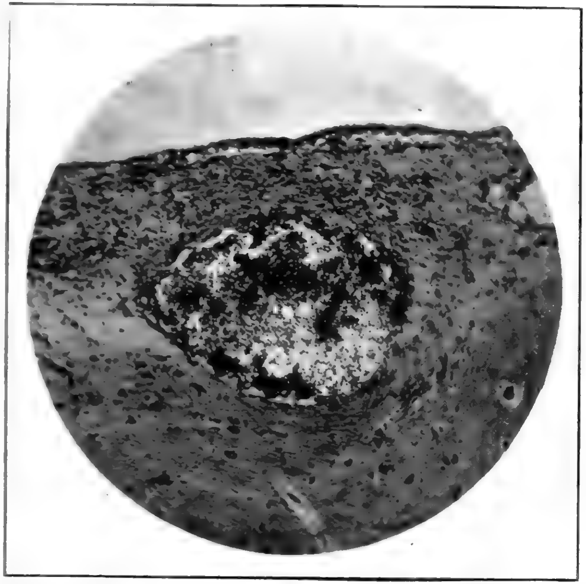

FIGURE 10—Cerebrum, frontal lobe—showing congestion and infiltration of cortex with lymphocytes and plasma cells. (eosin-hematoxylin). Leitz Oc. 2. Obj. 4.

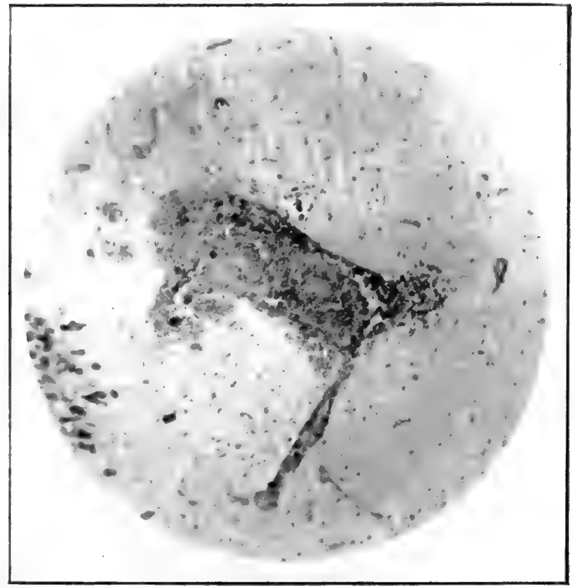

FIGURE 11—Ceremrum—frontal lobe—showing ruptured blood vessel with marked perivascular infiltration. (methyl-green-pyronin). Leitz Oc. 2. Obj. 4.

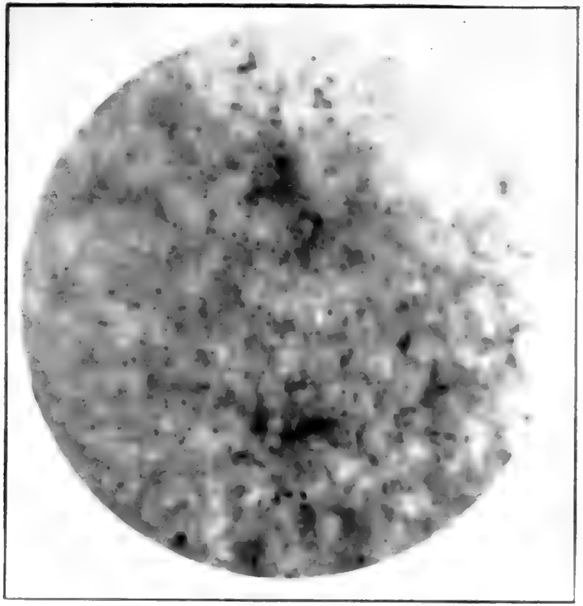

FIGURE 12—Smear of second subculture of Hog-Cholera virus from blood! Gram-fuchsin. Leitz Oc. 2. Oil immersion 1/12.

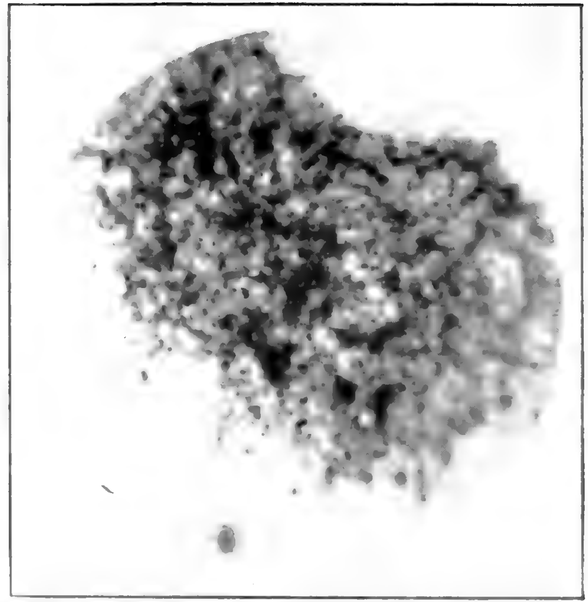

FIGURE 13 Smear of second subculture of Hog-Cholera virus from lymphgland. (Gram fuchsin). Leitz Oc. 2. Oil immersion 1/12.

ROARING IN HORSES AS IT RELATES TO HORSE BREEDING*

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The rapid encroachment of other forms of energy upon the field of usefulness of the horse and the increased cost of the production and maintenance of horses, are serving to demand greater individual efficiency. While the number of horses tends to decrease instead of increase the need for the horse in those positions still occupied by him are as insistent and important as at any time in history. The urgent need for horses has never been better illustrated than during the present world war. Other forms of energy have been introduced in such great volume and intensity that it would appear upon superficial observation that the war horse was extinct, but never before in the history of the world have nations gone so far, bought so many horses, or paid so high prices.

Laws to encourage horse breeding are as old as history. It has been suggested that the Mosaic Law forbidding the eating of horsemeat was prompted by the national need for conserving horse breeding. Several methods for encouraging horse breeding have long been in operation. Governments have subsidized horse fairs, either alone or as a part of agricultural fairs, and have paid liberal premiums to successful breeders. Governments have, in connection with agricultural colleges, maintained representative studs as a part of their material for teaching. Governments have also encouraged horse breeding by subsidizing superior stallions and their get and by inhibiting the use of inferior stallions by a system of stallion registration. The laws therefore have as their aim the rewarding of good horse breeding and the penalizing of bad breeding. Laws relating to horse breeding were naturally first enacted in the highly civilized continental European states, where the cost of horse production and maintenance were greatest and the demands for efficiency highest. The general aims of the laws were to perpetuate valuable lineage as expressed in pedigree, to secure for breeding purposes animals of high individual

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*Presented at the New York City Veterinary Medical Association, March 9, 1917.

merit, and to guard the progeny against diseases and defects so far as the parent might exert any influence.

It is highly interesting to note that present-day laws regulating horse breeding bear clear evidences of ancient origin. They reflect clearly today the conception of pathology of two or three centuries ago, especially in the field of forbidden diseases. The ancient concept of disease was that it came either from the parent or from evil spirits. The prevention or cure of disease was therefore predicated upon the elimination of the offending parent or doing away with the evil spirit. The evil spirits of the ancients are visualized today by pathogenic organisms and the parent as a perpetuator of disease still holds his ancient sway. My theme, roaring in relation to horse breeding, occupies a conspicuous place in the laws of the State of New York of 1916 concerning the licensing of stallions. Section 122 of those laws states:

"Any incurable, infectious or contagious disease with which the stallion may be afflicted shall disqualify such stallion for public service.

"Any transmissible unsoundness with which the stallion may be afflicted shall be named as such in said certificate of enrollment. The following diseases and unsoundnesses shall be defined as transmissible, for the purpose of this article: recurrent ophthalmia (moon blindness); cataract; amaurosis (glass eye); laryngeal hemiplegia (roaring or whistling); stringhalt; bone spavin, sidebone, navicular disease, and curb when associated with curby conformation of the hocks."

The stallion registration law of New York consequently names two groups of diseases which are to be considered in the enrollment of stallions for public service. In the first group, that of incurable infections or contagious diseases, no specific list of diseases is mentioned. It includes, inferentially, dourine, glanders, tuberculosis, and infectious lymphangitis. This paragraph of the law is devoid of practical significance because other precedent laws dictate that such animals shall be destroyed or kept in rigid quarantine.

Even if this group of diseases were not cared for by other laws, the stallion registration law would possess very scant efficiency, and might even work harm. A certificate made on August first serves as a health certificate for eight months—until April first of the next calendar year—but if issued on August second it has a life of twenty months. In either case, there is ample time for the stallion to acquire any disease of the group.

A stallion affected with one of the alleged non-infectious transmissible group of diseases is eligible to enrollment for public service, but is declared legally unsound, and the license so states. While the stallion is legally unsound, his progeny are legally sound. The law accordingly does not injure in any way the get of a legally unsound stallion. The only burden placed upon the stallion alleged to have a heritable unsoundness is that some prospective clients may be deterred from patronizing the stallion because he has been declared legally unsound. The actual difference between the present law and no law at all in this respect is not great. Most of the diseases named in the group are in clear evidence and freely observable by any prospective client. As a rule, the owners of mares have some belief about the heredity of these diseases and will withhold or extend their patronage according to their views. The stallion law, by publicly declaring the presence of the disease and its heritable character, may change the views of some mare owners. The owner of the stallion legally declared unsound will not be deterred by the law from asserting that the disease is not heritable and may do all within his power to convince prospective clients accordingly. So it occurs that the stallion declared legally unsound because of a heritable disease is not barred from service and suffers only from the stigma of the official publication of his alleged unsoundness, while his get are legally sound even though the sire has been declared affected with a disease transmissible to his progeny. If any of his get are stallions, they are legally sound and licensable as sound until such date as the alleged heritable unsoundness develops, when they too become legally unsound. In the meantime, they have had opportunity to transmit the alleged hereditary unsoundness to their get before they become legally unsound from an inherited affection. Accepting the allegation of the inheritance, our law permits the hereditary disease to go on perpetually.

If a stallion licensed as sound for eight or ten breeding seasons is fed on bad hay and contracts heaves, he becomes legally unsound, but his progeny of eight or ten years of stud service are legally sound. He is still licensable as unsound and his get, like those of his legally sound career, are also sound. He may then be carefully fed, the heaves may disappear, the stallion is again legally sound, and his get, before, during, and after his legal unsoundness, are all alike legally sound. They are eligible to license

as sound breeding animals and to entrance in state fairs as sound animals.

In the New York law, curb is a highly illustrative example of transmissible disease. "Curb, when associated with curby formation of the hocks," is an hereditary unsoundness. I am not certain what constitutes curb, but that is no matter. The horse is not legally unsound because he has curb nor because he has curby hocks. Neither the disease nor the formation inviting the disease offends the law. He may have ever so large a curb, or he may have two curbs, but that does not make him legally unsound, unless with the rest he has curby hocks, and his hocks may be ever so curby, bent like the front end of a toboggan, yet he is legally sound and eligible to registration as sound for breeding purposes. So long as he is kept in a bandbox and is never permitted to slip, draw a load or otherwise strain the weak member, he is legally sound, but, let him slip or suddenly jump and show a curb, he immediately becomes an unsound sire.

The New York law proceeds upon the basis that the designated diseases are hereditary but that any malformation or tissue defect which tends to cause a disease is not hereditary. If for example scrotal hernia were included in the list, it would not be the open ring which would contitute legal unsoundness, but when the herniated intestines became incarcerated the stallion would become legally unsound. As he would probably die in a few hours, this would matter little to either stallion or owner, and, since only the incarceration of the intestine renders the stallion legally unsound, scrotal hernia is omitted from the list of transmissible unsoundnesses.

Turning to the specific subject of roaring, similar conditions apply. A stallion may remain legally sound for several years and render highly satisfactory service in the stud, when suddenly it is discovered that he is a roarer. Then he becomes legally unsound, while his get remain legally sound. But under the New York law he must be a certain kind of roarer: in order to be unsound, he must have laryngeal hemiplegia. Should he have laryngeal biplegia, the law takes no account of him and he is presumably legally sound. A century ago when the pathologic concepts flourished upon which our modern (?) stallion laws are based, there was an abundance of laryngeal hemiplegia, but laryngeal biplegia was virtually unknown. Now, when most roarers are relieved sur-

gically, practically every operator recognizes laryngeal biplegia only and operates upon both sides of the larynx. To the modern surgeon, larygeal hemiplegia is a tradition. Here, again, the law apparently does not aim to declare a horse legally unsound because he roars, because he has a defect which renders him liable to roar, nor because there is laryngeal paralysis, either unilateral or bilateral. The horse is apparently legally unsound under the law only when he has laryngeal hemiplegia and roars or whistles. If the paralysis is present and the roaring naturally obviated, or if the roaring has developed and been later relieved surgically, the animal is legally sound. At least, I find no demand in the law that a stallion cured of roaring be declared legally unsound. Indeed, it would be difficult to declare a stallion unsound when no unsoundness is detectable by ordinary examination. Since the introduction in 1905 of a successful operation for roaring, many breeding stallions have been operated upon successfully in the State of New York, and presumably most or all of them have been registered as sound under the stallion registration laws. Legally, I see no way by which a veterinarian, without knowledge of the operation having been performed, examining such stallions and failing to detect any roaring, can do otherwise than certify them as sound. Ethically, I should not hesitate a moment in certifying that such a stallion was sound, though the law would bar me from certifying that the stallion which had not been successfully operated upon is sound. One veterinarian may pronounce a horse a roarer; another equally skillful and conscientious may consider him free. Consequently, if one veterinarian pronounces a stallion a roarer one year and another veterinarian pronounces him free from roaring the next year, the central authority and the law cannot tell whether the difference in report is one of opinion or whether in the interval surgical relief has been applied.

Behind all this maze of contradictions and ambiguities are some profound, basic scientific considerations. The most fundamental one is whether disease is heritable or not. In a strict etymologic sense, such chronic infections as tuberculosis, syphilis, and others are heritable—that is, they are readily transmitted from parent to offspring—but this is not our actual meaning of a heritable disease. As nearly as it can well be defined, it is a disease transmitted through and is an integral part of the germ plasm. The disease needs to be a part of the ovum or spermatozoon—not

a micro-organism borne in the generative cell, but an inseparable part of the germ cell. The evidence of such disease transmission has been disintegrating under the inexorable revelations of science until no disease exists in which there is good evidence of such hereditary transmission.

The believers in heritable diseases then fall back upon a far stronger line of defense, the hereditary transmission of a tendency to disease, of a vulnerability. The transmission of anatomical characters is quite freely admitted and affords the scientific basis for breeding. If a calf belonging to a horned breed is born hornless, its peculiarity tends to be repeated in its progeny. We understand that if a male has one cryptorchid testicle, his male progeny will be largely cryptorchid. That is the fixation of a variation in structural type and is transmitted in the same manner as color, form, or disposition. It is not a disease, nor in any appreciable measure a tendency to disease. Referring to our New York stallion law, curby hocks always predispose the individual to curb: the hock is weakened by its faulty build and any strain may precipitate a curb. The curby hocks are just as heritable as straight hocks, and consequently the get of a curby-hocked horse may inherit curby hocks, which predispose to curb.

In roaring no such variation in anatomical structure or arrangement is recognizable. The young colt is sound, and the roaring develops suddenly and unexpectedly. Some have said that a certain conformation predisposes to roaring, but the allegations are contradictory. Some say it is the long, slender, finely chiseled neck, if the roarer present is of that type; others that it is the short, thick neck, with narrow inter-maxillary space. The doctrine of form as a cause of the disease usually bends to meet the present emergency.

In one important sense a hereditary vulnerability to a given disease must be recognized. Swine are vulnerable to hog cholera; other domestic animals and man are immune. Horses are hereditarily predisposed to heaves and to roaring; this is a generic heredity, without any relation to the subject under discussion.

Stallions become roarers more frequently than geldings and geldings far more frequently than mares. They are predisposed in the order named, but we cannot affect the prevalence of roaring from this standpoint because we have no control over sex. The vocal cords of the stallion are longest and of the lowest tone and

the ventricular sinuses of the stallion naturally larger than in the gelding or the mare. A larger volume of air may become impacted into the ventricles of the stallion than in that of the gelding or the mare, and hence the stallion is more likely to roar. There is no evidence that the paralysis is most frequent in the stallion, but merely that the prominent roaring is most frequent. In the dissecting room, atrophy of the laryngeal muscles is very common in old geldings and mares, though they were not known to have been roarers.

Roaring is very common amongst hunters, as compared with other breeds of horses. In a way hunters are predisposed or vulnerable—not to the disease, but to the symptom of roaring. The hunter is put to an extreme test at a comparatively early age. If the vocal apparatus is paretic, the air stream becomes impacted into the laryngeal ventricles, distends them, further overtaxes the paretic muscles, and eventually brings about a much enlarged ventricle, which, filled with air upon slight provocation, forces the vocal cords and arytenoid cartilage far out into the glottis, obstructs it, and chokes the animal. An ordinary horse of no particular breeding having the same degree of laryngeal paralysis is not exerted—the ventricles are not distended with air, the connective tissue gradually retracts, and the vocal cords and arytenoids are passively held out of the glottis—the horse does not roar.

When a study is made of the pathology and etiology of roaring, little is found to suggest heredity. Thomassen of Utrecht, by careful study, showed that roaring is due to a peripheral degeneration of the recurrent laryngeal nerves, with the inevitable paralysis and atrophy of the dilator muscles of the larynx, should the disease be sufficiently chronic. It is difficult for one to imagine that the peripheral end of a motor nerve—a structure which has grown out from the spinal cord—could undergo a degeneration from heritable causes. It might be understood how a foal could be born with an imperfect larynx because of a congenital defect of the larynx of a parent, but how the animal could be born with a perfect larynx, the organ function well for three to six or seven years, and then undergo motor nerve degeneration from hereditary causes, is difficult of comprehension. So specific a degeneration, so uniform in its pathologic behavior, as the degeneration of the recurrent nerves at their peripheral ends, suggests that most cases, perhaps nearly all cases, are referable to

one common cause. It is interesting therefore to try to select cases where the causes appear to be plain in outline, however cloudy in detail, and see what they teach. Roaring occurs in two well marked groups, from the standpoint of frequency—enzootic and isolated—and in two groups as to duration—acute and chronic. In the enzootic outbreaks of roaring the very enzootic character denies most emphatically the hereditary character of the disease. Roaring suddenly breaks out and involves simultaneously or in rapid succession a large percentage of horses or mules in a stable, a field, or upon an open range. The affected animals have no common source of origin except they belong to the equidae or are hybrids with the ass. Had their ancestors been cattle, sheep, or swine, confessedly they would not have roared, because these latter genera are immune to the fundamental causes of roaring. Aside from the generic vulnerability of the horse to the causes of roaring, hereditary predisposition is in these cases overthrown. For example, in one instance, near Rome, New York, a few years since, twenty-five mules belonging to a contractor were wintered by a canning establishment upon pea ensilage. In the spring, eight of them, or thirty per cent., were roarers. One strangled to death; the others suffered in varying degrees. The mules were presumably bought in the open market, probably at one time, of unknown parentage beyond the fact that they were hybrids. It is scarcely conceivable that they were importantly related. Even had they all been sired by the same jack, it is not conceivable that such a group of mules of varying ages would suddenly and simultaneously give way to a hereditary taint. It must be accounted for in another way. All were typical roarers and, when operated upon, each presented the regular characters of roaring.

In central Illinois, some thirty years ago, there was a severe, early frost which froze much green corn. The weather then became warmer and the frozen corn moulded on the stalks in the fields. In one such field a client placed twenty or thirty mares and colts, after the sound ears of corn had been gathered. The animals were not intimately related. Several were by one of the sires on the farm, but all the sires were sound and so remained. Some of the animals were imported from France; others were home bred. A large proportion of the animals suddenly became roarers. The first one was an aged mare which strangled and fell

while at play in the field. Apparently there was not only laryngeal paralysis, but also general paralysis, and she lay quietly on the ground until I reached her several hours later. Then she got up and appeared perfectly well. The next to show the disease was a young imported mare, which while at play strangled and fell dead. Then it was observed that several of the animals would roar if driven rapidly. The stallion and some other horses kept in the stable and fed the ripe ears of corn gathered in the same field were sound. Surely such an eruption of roaring could not be attributed to heredity.

At about the same date, several serious outbreaks of roaring were recorded upon the open ranges of Colorado in which large numbers of horses inexplicably and simultaneously became affected. At nearly the same time a large number of horses in the Silver Bow valley near Butte, Montana, became roarers, and many strangled to death. Suits for damages were brought or contemplated against the owners of certain smelters, upon the hypothesis that the mill tailings discharged into the stream, from which water was taken to irrigate the pastures, contained soluble mineral poisons which, contaminating the pastures, poisoned the horses and caused the roaring. (The Butte mines carry copper, silver, lead, arsenic, and other metals.)

A large omnibus company in Paris, many years ago, purchased a cargo of imported Indian vetches (*Lathyrus sativa*) and began feeding them to their horses. In a few weeks many horses became roarers; several strangled to death in the street and in the stable. The feeding of vetches was discontinued, and no new cases of roaring occurred. Similar experiences with the vetch occurred in Glasgow and other European cities. At the time I observed the outbreak of roaring amongst the horses being pastured in the cornfield where many frozen and later mouldy ears of corn were left on the stalks, the freezing of corn occurred of course upon other farms. Generally, however, only a few ears were frozen. The field in which the large degree of roaring occurred had suffered unusually severely from the freezing. Besides, most farmers pastured large numbers of cattle in the cornfields after gathering the sound ears and the cattle quickly ate all the frozen ears they could find. Cattle do not roar. Still, isolated roarers were common at that period. Upon one farm, with numeous horses, one case occurred. After three or four fits of

strangling, the animal fell dead in the street while she was being led at a walk to the halter, an hour or two after I had examined her and searched in vain for any disease. A careful autopsy revealed nothing. The juxtaposition in location and time suggests that the isolated and enzootic outbreaks were identical and that neither could logically be assigned to heredity. The question inevitably follows: If enzootic outbreaks are non-hereditary, can isolated cases be hereditary? So far as known, the pathology in each case is identical. There is a degeneration of the peripheral end of the recurrent laryngeal nerves, followed by paralysis and atrophy of the laryngeal muscles. When, so far as can be seen, the pathologic changes are identical, our rule is to assign them to identical causes. There occur in the lungs of glandered horses certain characteristic nodules, which, when they are observed, are regularly ascribed to glanders.

In the pronounced outbreaks of roaring, there exists a suggestion of a common cause—some contamination of the food. Peas, vetches, and corn are healthful foods which call for no defence. In isolated cases, may not the fundamental cause again be the food? We need only imagine that the food was but mildly contaminated, or perhaps one animal eats more of the offending food, or at a given period the health of the individual was poor and its power of resistance temporarily lowered. Thus might be explained the frequency of isolated roaring after contagious pneumonia.

There remains one other important consideration in connection with the transmission of a tendency to roaring from parent to offspring. I have granted that the horse, as a genus, is predisposed to roaring, and that swine and sheep are not—that there is a generic heredity. The laws of heredity are applicable alike to vigor and weakness, to progress and retrogression. In milk fever, there exists a heredity to disease as well marked as is known in animals, but the tendency to the disease is inseparably linked with dairying efficiency. Two methods of combating the disease arose. At first, as soon as a cow reached that degree of efficiency which made her subject to the disease she died from it, and ceased at once to produce further progeny to suffer from it. This was expensive to the dairying interests. Schmidt revealed a method for combating the disease which has almost eliminated it, though the hereditary tendency thereto is greater than ever.

In horses azoturia is observed in a certain type of animal and

by the rules of heredity horses subject to this mortal affection inherit the tendency from their parents. This tendency is an inseparable part of high efficiency. No effort is made to control the disease by the selection of sires, because the animals not subject to azoturia are not desired or desirable.

How frequently do poor horses become roarers? I think every careful observer will agree that the tendency to roaring increases as the vigor and efficiency of the animal. I do not mean that the nondescript cheap horse does not frequently suffer from peripheral degeneration of the nerve as the good horse. I am now discussing the symptom of roaring—that symptom which in the New York State law is legally recognized as heritable. The good horse is more severely tried. As a rule, such vigorous breeds as trotters and hunters are put to severe work early in life. They are called upon to tax their respiratory apparatus to the limit. The vocal apparatus included within the larynx, being paretic, the large stream of air demanded by the lungs during severe action impacts behind the vocal cords in the ventricles and distends them. Repeated impaction of the air stream only intensifies the paralysis and atrophy and increases the size of the ventricles, thus emphasizing the one symptom of roaring. The cheaper or less promising horse is not so severely tested and gradually the connective tissue framework of the atrophic muscles retracts, the ventricle does not enlarge, and the animal does not roar. Roaring, as measured by the symptom of inspiratory dyspnoea, is preeminently a disease of good horses, but when viewed from the standpoint of degenerative changes in the peripheral ends of the recurrent laryngeal nerves it is, so far as we know, approximately alike in all classes of horses, but the New York law condemns the good horse because he roars and approves the poor horse because he does not roar, though each has identical pathologic lesions.

In discussing this subject also, it should be remembered that roaring is not a disease of the respiratory apparatus proper. It is a disease of the vocal apparatus, and the respiratory difficulties encountered are incidental. It has been erroneously taught that the arytenoid cartilages and vocal cords are essential organs of respiration and deglutition. This has been completely overthrown by the roaring operation. After a successful operation, the horse is sound so far as respiration and deglutition goes. Vocally, the horse is unsound and mute. But horses are usually mute.

They use their vocal apparatus more rarely by far than other domestic animals. Has this failure to use the vocal organs predisposed them to degeneration?

Clinically and historically there is little or no evidence of the heredity of roaring. The enzootic outbreaks referred to can not be hereditary and may occur in any country. The isolated cases are subject to interesting restrictions. They are observed almost exclusively in horses kept in stables. The disease in isolated form is seen chiefly in low countries and, except some very marked enzootic outbreaks, is almost unknown in arid mountain regions. I have known many roarers. I have observed several stallions which were bad roarers and yet kept for breeding. I have not known a roarer to beget a roarer. I have been unable to trace roaring in a single case to a parent. If a stallion is kept upon a certain farm and there develops roaring, there is no logical reason why his get kept on the same farm, fed the same food, and in every way handled alike should not roar. It would be strange indeed if in a measure they did not. Apparently this is true. Horse breeders in low lying Great Britain believe explicitly in the heredity of roaring and are most vigorous in attempting to repress it by excluding affected sires, but they have more roarers than careless America. Ormond, I am told, got roarers in England—or perhaps it would be better to say that Ormond's progeny in England became roarers—and he was promptly sold out of the country. In America, I hear, his get did not roar more than the get of sound stallions.

Having regard for the above considerations, I have long held and still hold that it is an error in principle and in practice to exclude or handicap stallions in breeding because they are recognized as roarers. I believe that, whenever and wherever any recognizable congenital defect exists in an animal, such as umbilic and scrotal hernia, cryptorchidy, and curby hocks, the animals, whether male or female, should be discarded from breeding. When, however, a disease appears as a result of error in the food, housing, or care of the animal, such disease should not militate against the use of the animal for breeding. I am especially opposed to disqualifying a stallion for roaring because, in addition to my thorough disbelief in the heredity of roaring, the exclusion of such stallions is especially liable to destroy the usefulness of our best breeding stock.

STATE BOARD EXAMINATIONS*

C. J. SIGMOND, Pipestone, Minn.

It has often been the subject of comment and inquiry that so many candidates fail in the examinations conducted by our board. There are various reasons for these failures. The board arranges its examinations with the greatest possible care, and spends as much time in conducting them and marking the results as any other board in the country. The examinations are given under civil service rules and at no time does an examiner know whose paper he is marking, as an identification card is filled in and handed in sealed, to the secretary of the board, and after that all papers are signed by a number contained on identification card, and no one is identified by these numbers until all marks are in and assembled. It endeavors, so far as possible, to avoid questions which necessitate memorizing abstract data and facts of no particular value, and in medicine to avoid difficult prescriptions and incompatible preparations. But it is very difficult for a board to frame questions that will fit the mental capacity of the majority of the candidates who appear before it, unless such board considers its work merely a perfunctory duty, to be disposed of in the easiest possible manner in the least possible amount of time.

The prevailing thought among the candidates of today seems to be to get through every task with the least exertion; and, therefore, it is impossible for these to show even fair knowledge in veterinary science, in the length of time they devote to the study of it and in which they use their time.

The idea seems to be general that a thorough knowledge of veterinary science may be obtained by the average student after three years in a veterinary college or university where veterinary science is taught. Such a feat is not impossible, but the students who would burn the amount of midnight oil necessary to its accomplishment, are comparatively few. I still believe, as I stated at one of our previous meetings, that it should be absolutely necessary for students to spend at least four months each year between sessions, with a qualified graduate veterinarian, thus getting practical experience.

*Presented at the meeting of the Minnesota Veterinary Medical Association, January 1917.

The young people of today, as a class, are not studious; they are pleasure loving. At school, college, and university, they waste a great deal of valuable time in outside activities, and social enjoyments and "cram" for examinations. I am a firm believer in a proper amount of recreation and social enjoyment, but these should never be allowed to interfere to any serious extent with the course of study. There are, of course, in every school some who can devote a great deal of time to matters outside of the prescribed course and still keep their work up to a high level, but the majority can not do this. When those who have wasted valuable time in one way or another, appear as candidates before a quasi-judicial body, such as a veterinary examining board, and are given examinations to determine how much of their education has been retained and how much of their education has filtered through, then we hear complaints of the unfairness of some of the questions given, the difficulty of the examinations as a whole, or the objectionable personalities of the examiners, as excuses for ignorance, carelessness, or both combined. In case you may think these strictures too severe, let me give you a few answers, taken at random, from recent examination papers. You will note that there is nothing unusual about the questions asked, nothing to be construed as a "catch question", nothing that can be construed excepting that they are fair and right and everyday questions, given in the different schools and institutions of learning, as are necessary, in order to ascertain the advancement of the student in the subjects given.

QUESTIONS IN GENERAL EDUCATION. Write a letter of not less than fifty words and not more than one hundred words, dating the letter at Saint Paul, Minesota, and addressing it to the Minnesota State Veterinary Examining Board, at Saint Paul, Minnesota. Do not refer to your political or religious opinion or affiliations, and do not use your name as a signature, but use examination number. Subject of your letter should be: "The practicability and desirability of veterinarians keeping accurate records of their cases".

ANSWER.—St. Paul, Minn, 7-11-16.

Minnesota State Veterinary Examining board,
Dear sir.

Just a few lines in regards to a patient which I have had under

my care, which I would for you to see this patient and have you give me your opinions of it I am

Yours truly

No ....

QUESTION.—What is meant by a horse power?

ANSWER.—Horse power meant by a horse pulling 250 pounds over pulley 250 ft. high in one minute.

ANOTHER ANSWER.—I cant remember.

QUESTION.—Name the capitol cities of the following states: Alabama; Connecticut; Iowa; Minnesota; New York; Oklahoma, South Carolina; Tennessee; Virginia; Wisconsin.

ANSWER.—One candidate tried to answer three, as follows: "Capitol of Alabama, Pensilvania (New York—New Jurissie)* If this candidate had not been told to report at the Capitol Building, Saint Paul, I do not know what state would have been the Capitol of Minnesota. (*Note the spelling).

Still another candidate gave Minneapolis as the Capitol of Minnesota.

Some of the candidates do not know how to spell the common terms used in veterinary practice; i. e., the word "operation", some candidates writing "opperation"; "college", one candidate writing "chollege"; another writing "catheder" for "catheter".

I will now give you a few questions and answers in other subjects:

QUESTION.—What genus of animal is subject to Johne's disease?

ANSWER.—Man, dogs, and goats.

ANSWER.—Horses, Mules, and Asses.

QUESTIONS.—Name three diseases in which you would expect to find a sub-normal temperature.

ANSWER.—Pneumonia, sun-stroke, and glanders.

QUESTION.—Locate and describe the suspensory ligament? State its function.

ANSWER.—Three of the candidates located it in the abdominal cavity, two of them stated its function is to suspend the uterus, and one stated that it suspended the whole abdominal viscera.

QUESTION.—Give average normal pulse of the horse and ox.

ANSWER.—Some gave the average pulse of the horse 45 to 50; while another gave it 60 per minute; and the pulse of the ox at 32 to 36.

QUESTION.—(a) Give the number of teeth in the horse. (b) How many temporary? (c) How many permanent? (d) At about what age is dentition complete?

ANSWER.—Some of the candidates did not seem to know that there were any other temporary teeth only the incisors.

QUESTION.—Prescribe for a horse suffering from acute indigestion.

ANSWER.— ℞ Spts Camphor
Spts Chloroform
Ol. Eucalyptus a a ℥ ii
Met. ft. sol.
Sig: ℥ i every 2 hours till pain is relieves.

℞ F. E. nux vom ℥ v
F. E. Gent ℥ viii
Aqua Q. S. ℥ xvi
Shake and give three tablespoonful on feed every three or four hours.

℞ Ol. Tenbinthniae ℥ i
Ac. Salicyli ℥ ii
Chloral ℥ iv
Spts. Vini Rect ℥ vi
Met ft Sol
Sig: Give at one dose.

QUESTION.—Write a prescription for a blister, in the form of an ointment.

ANSWER.— ℞ (A Blister)
Pot Iodide ℥ ii
Vaseline ℥ viii
Mix thoroughly.

℞ Hydrargyrum Iod Rub ℥ iii
Pulv Catharis ℥ ii
Ol. Mustard ℥ i
Misce fiat massae.

QUESTION.—What are alkaloids?

ANSWER.—Alkaloids are derivities from some medicine.

FURTHER ANSWERS.—Alkaloids are medicines in pils.

Alkaloids are agents prepared by laboratories, to be used in the treatment and prevention of diseases.

QUESTION.—Name four alkaloids.

ANSWER.—Sodii phosphate, potassi nitras, sodii chloride, potassii chlorate.

QUESTION.—What is the principal alkaloid of calabar bean and give its dose for a horse.

ANSWER.—Principal alkaloid of calabar bean Nux vomica.

Dose ℥ i to ℥ iss

ANOTHER ANSWER.—Eserine.

Dose ℥ ii to ℥ x

ANOTHER ANSWER.—Physostigmine.

Dose ℥ ii to ℥ iv

QUESTION.—What is strychnine?

ANSWER.—(a) Strychnine, it is a poison which many cause death very rudely if doses are given to large. (Note spelling, syntax, etc.)

QUESTION.—Describe its action and uses, giving hypodermic dose for horse and dog.

ANSWER.—Action of Strychnine Anodyne and stimulant. Dose sub-cut grain i to grains iii.

Dose of strychnine for dog ¼ of grain; it induces coma in the dog.

QUESTION.—Give treatment for horse suffering with tetanus.

ANSWER.—Treatment for tetanus, soft nourishing food and good cathartic—sedatives—strychnine and alcohol for the heart.

QUESTION.—(a) Give action of ergot. (b) How and where is it obtained and what contagious disease might chronic ergotism be mistaken for?

ANSWER.—(b) Ergot is obtained from ergot root by abstracting the drug from the roots by boiling. Chronic ergotism may be mistaken for rheumatism.

QUESTION.—Describe the actions of arecoline hydrobromide, and give the dose for: the horse; the cow.

ANSWER.—Dose of arecoline: Horse 1 to 2 c.c.; cow 2 to 3.

QUESTION.—Give period of gestation of mare, cow, bitch, and cat.

ANSWER.—Mare 21 days. Cow, 14 days. Bitch, 7 to 8 days. Cat, 16 days.

QUESTION.—What is sterility?

ANSWER.—Sterility means that the patient is not sterile.

QUESTION.—Describe differences between removing placental membrane from mare and cow.

ANSWER.—Remove afterbirth from mare and cow in mare the mucous membrane of uterus should be removed with the placental menbrane. (Note spelling.)

Such answers show ignorance, carelessness, and lack of reasoning power, yet all of the candidates who wrote these just mentioned believed themselves qualified to practice as veterinarians. What is most needed to raise the percentage of success in our examinations is to rid ourselves of the idea that a knowledge of veterinary science sufficient to entitle a candidate to practice it with safety to the public can be obtained in a "catch as catch can" manner. It cannot be obtained by simply putting in the prescribed time by merely attending classes in a college or university where veterinary science is taught. Veterinary science today is more complex than ever. The old order of things has changed from what it was a score of years ago. The veterinarian of today is expected, and rightly so, to be able to determine by microscope, serum, etc., to diagnose and treat diseases, thus the demands made upon students are constantly increasing and more time and study are required than ever before to meet modern conditions.

After having had such a class of men as this present themselves before the board and the board having given them reasonable opportunities to show how much they know, the board can come to no other conclusion excepting that the applicant for examination has either been admitted to a school erroneously with a lack of preliminary education to grasp the great field upon which he enters when taking up the study of veterinary medicine; or the applicant for examination before the board has not received the necessary amount of education while in school to prepare him to meet these examinations as given by state boards, when the time and opportunity present themselves.

—Dr. J. N. L. Couture has removed from Montreal to St. Lambert, Quebec.

—Dr. J. L. Shabram has removed from Oelrichs, So. Dak., to Hartford, So. Dak.

—Dr. H. G. Wenborne has removed from Milwaukee to Wauwatosa, Wis.

SOME ASPECTS OF THE PHYSIOLOGY OF MAMMARY SECRETION*

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I. Introduction. Since the advent of the hormone doctrine by Bayliss and Starling, in recent years many important contributions have been made to our knowledge of this subject, particularly with regard to the relationships existing between the mammary glands and the organs of internal secretion. In 1910 Ott and Scott[1] discovered that "Infundibulin" (a 20% extract of the posterior lobe of the pituitary body) had powerful galactagogue properties. Schäfer and Mackenzie[2] substantiated the work of Ott and Scott; they observed that the injection of pituitary extract into a lactating cat resulted in the secretion of milk almost immediately after the injection. Mackenzie[3], in later researches, found that this property was not restricted to sex nor even to mammals since the secretion of milk was obtained as a result of the injection of pituitary extract from birds and from male animals. Herring[4] obtained similar results from the injection of the pituitary extract of the cod.

Hammond[5] by the use of commercial pituitary extract (pituitrine) in lactating goats produced a secretion of milk, very rich in fat, which was followed by decrease below normal in the milk secreted at the next milking period.

Gavin[6] demonstrated that the use of pituitary extract to increase the secretion of milk in dairy cows was not practical from a commercial standpoint since the total amount of milk secreted per day was not increased by its use.

Hill and Simpson[7], working independently and without the knowledge of Hammond's experiments, obtained a decided increase in milk secretion in lactating goats as a result of the injection of pituitary extract. The milk thus obtained had a much higher fat content than normal milk. There was a corresponding decrease below normal in the milk secreted at the next milking period although the percentage of fat it contained was not always decreased as was reported by Hammond.

Hill and Simpson[8] next experimented upon dairy cows with

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like results. They used the saline extract of eight posterior lobes of the pituitary as one injection which was given intravenously immediately after the evening milking. The cow was milked a second time just fifteen minutes later and in one instant gave one pound of milk testing 19% of fat at this second milking while only 8.3 pounds of milk testing 7% was obtained at the normal milking just preceding. The amount of milk obtained at the next milking period was much less than normal and also contained less fat.

Mackenzie[9] and also Schäfer[10] record experiments on the effect of "pituitrine" injection in the human subject. As a result of their investigations they both have concluded that there is an increased secretion of milk following the pituitrine injection of the expense of the milk that would normally be secreted at the next milking.

Since the last mentioned authors made no effort to determine the qualitative changes in the milk due to pituitrine injection in the human subject Hill and Simpson[11] decided to investigate this point further. The subject was a young married woman nursing her second child. The milk was withdrawn with a breast pump ten minutes after the subcutaneous injection of 1 c.c. of pituitrine which was made after the evening nursing, all experiments being controlled by similar normal milkings. In all of these experiments the increase in milk secretion due to pituitrine injection was very marked as was also the increase in total amount of fat secreted. The patient could feel the milk "coming into the breasts" with a sensation between a tickle and a sting which is the same sensation that is felt when the baby begins nursing.

The following paper is an account of experiments conducted at the instigation of Dr. Sutherland Simpson to whom I wish to express my gratitude for advice and encouragement and in some instances active cooperation.

The object of these investigations was to study further the effect of pituitary extract injection on the quality and quantity of milk secreted, its mode of action, and the effect of its repeated injection upon the animal.

II. The Effect of Injections of Pituitary Extract Upon the Quality and Quantity of Milk Yielded. That the injection of pituitrine stimulates the secretion of milk abnormally rich in fat is shown by the following tables. Unless otherwise stated the injection was intramuscular, 2 c.c. of Parke, Davis & Co. pitui-

trine being used. In table No. I, goat No. II, an Angora was used. She was milked at 9 A. M., 4 P. M. and 6 P. M., the two hour interval between 4 P. M. and 6 P. M. allowed sufficient time for a sample, large enough to be analyzed, to be secreted. The injection was always made just before the 6 P. M. milking. All the injection periods are starred in the table.

TABLE No. 1, GOAT No. II.

Date	Hour	Amount of Milk	% of Fat	Grams Fat
June 5th	9 a. m.	100 c.c.	4.8	4.8
June 5th	4 p. m.	100 c.c.	5.8	5.8
June 5th	6 p. m.	20 c.c.	7.3	1.46
June 6th	9 a. m.	175 c.c.	4.0	7.00
June 6th	4 p. m.	90 c.c.	7.8	7.02
June 6th	6 p. m.	*100 c.c.	*10.5	*10.50
June 7th	9 a. m.	110 c.c.	4.4	4.84
June 7th	4 p. m.	95 c.c.	5.9	5.60
June 7th	6 p. m.	22 c.c.	5.8	1.27
June 8th	9 a. m.	200 c.c.	4.6	9.20
June 8th	4 p. m.	75 c.c.	6.6	4.95
June 8th	6 p. m.	*90 c.c.	*11.9	*10.71
June 9th	9 a. m.	125 c.c.	4.8	6.00
June 9th	4 p. m.	80 c.c.	7.2	5.76
June 9th	6 p. m.	25 c.c.	5.7	1.42
June 10th	9 a. m.	180 c.c.	4.6	8.28
June 10th	4 p. m.	80 c.c.	8.0	6.40
June 10th	6 p. m.	*70 c.c.	*10.0	*7.00
June 11th	9 a. m.	115 c.c.	5.5	6.32
June 11th	4 p. m.	85 c.c.	6.5	5.52
June 11th	6 p. m.	25 c.c.	4.9	1.22
June 12th	9 a. m.	200 c.c.	4.8	9.60

By examining the above table it can be seen that on June 6th there were 20 c.c. of milk testing 7.3% fat secreted at the 6 P. M. milking and a total of 1.4 grs. of fat. On the following evening under exactly the same conditions, except than an injection of pituitrine was given fifteen minutes before milking, we have a yield of 100 c.c. containing 10.5% of fat making in all 10.5 grams of fat as compared with 1.4 gr. on the preceding evening. The average yield of fat for the three evening milkings when an injection was given was 9.40 grams while the average of the four normal evening milkings was 1.34 grams.

That this increase in secretion was followed by a decrease below normal at the next milking period can also be seen from the table. The average secretion of fat for the three morning milkings in which an injection was given on the preceding evening was 5.7 grams as compared with 8.5 grams on mornings that did not

follow an injection evening, or a decrease of about 3 grams of fat per day. Subtracting this 3 grams from the total gain of 9 grams we still have a net gain of about 6 grams of fat per day due to the injection.

By examining tables I to VI the increase in secretion of milk and also of fat can also be seen. The fat is known to be the most variable constituent of the milk. To determine whether or not it was the only component altered by the injections was the object of further studies. The following table in which the injection periods are starred show it to be the only one of the milk solids that is appreciably affected by the injection.

TABLE No. II, GOAT No. II.

Date 1914	Amt. of Milk	% of Fat	% of Protein	% of Ash	% of Sugar	% total Solids
June 2nd, 6 p. m.	130 c.c.	6.0	4.60	.96	3.75	15.31
June 3rd, 9 a. m.	180 c.c.	5.0	——	.84	——	14.58
June 3rd, 6 p. m.	100 c.c.	8.0	4.71	.92	3.96	17.59
June 4th, 9 a. m.	165 c.c.	4.6	4.05	.91	3.86	13.42
June 4th, 6 p. m.	*130 c.c.	*10.0	*4.18	*.93	*3.70	*19.61
June 5th, 9 a. m.	100 c.c.	4.8	4.55	.99	4.33	14.67
June 5th, 4 p. m.	100 c.c.	5.8	4.58	.94	4.10	15.42
June 5th, 6 p. m.	20 c.c.	7.3	——	.88	——	17.64
June 6th, 9 a. m.	175 c.c.	4.0	4.45	.90	4.07	13.42
June 6th, 4 p. m.	90 c.c.	7.8	4.61	.94	4.43	17.75
June 6th, 6 p. m.	*100 c.c.	*10.5	*4.51	*.88	*4.72	*19.62
June 7th, 9 a. m.	110 c.c.	4.4	4.35	.86	4.58	14.19
June 7th, 4 p. m.	95 c.c.	5.9	4.98	.96	4.67	16.51
June 7th, 6 p. m.	22 c.c.	5.8	——	.88	——	15.92
June 8th, 9 a. m.	200 c.c.	4.6	4.74	.95	3.79	14.08
June 8th, 4 p. m.	75 c.c.	6.6	4.90	.90	4.01	16.41
June 8th, 6 p. m.	*90 c.c.	*11.9	*4.44	*.90	*3.74	*20.01
June 9th, 9 a. m.	125 c.c.	4.8	4.98	.97	4.65	15.40
June 9th, 4 p. m.	80 c.c.	7.2	4.74	.85	3.83	16.62
June 9th, 6 p. m.	25 c.c.	5.7	——	—	——	——
June 10th, 9 a. m.	180 c.c.	4.6	4.58	.82	4.72	14.72
June 10th, 4 p. m.	80 c.c.	8.0	5.28	.90	5.80	17.98
June 10th, 6 p. m.	*70 c.c.	*10.0	*5.10	*.84	*3.79	*17.93
June 11th, 9 a. m.	115 c.c.	5.5	4.74	.93	4.80	15.97
June 11th, 4 p. m.	85 c.c.	6.5	4.55	.96	4.03	16.42
June 11th, 6 p. m.	25 c.c.	4.9	——	—	——	——
June 12th, 9 a. m.	200 c.c.	4.8	5.12	.81	4.30	15.03

Space not permitting the use of all tables of the experiment only one is here given which is characteristic of all the others and demonstrates the fact that the fat alone was affected by the injection. Fifty-eight additional samples of milk from two other goats were completely analyzed.

That the fat is invariably increased in amount due to the in-

jection of pituitary extract is also shown in the results recorded in the following chapter.

III. THE EFFECT OF REPEATED INJECTIONS OF PITUITARY EXTRACT UPON THE SECRETION OF MILK. In a previous experiment (table No. I) it was noted that when a two hour interval was allowed to elapse between injections that a decided response could be obtained at the second injection. This suggested the possibility of increasing the total daily yield by injecting at two hour intervals throughout the day. The following experiment was conducted to determine this point. Goat No. 2 was used in this experiment. She was milked at 9 A. M. and again at 11 A. M., 1 P. M., 3 P. M., and 5 P. M. following injections of 1½ c.c. of "pituitrine". The following table gives these results and shows also the after effect:

TABLE NO. III. GOAT NO. II.

Date	Hour	c.c. of Milk	% of fat	Remarks
June 25th	9.00 a. m.	130	5.2	
June 25th	11.03 a. m.	57	9.0	After an injection of pituitrine
June 25th	1.05 p. m.	18	8.8	After an injection of pituitrine
June 25th	3.13 p. m.	14	5.8	After an injection of pituitrine
June 25th	5.16 p. m.	14	5.8	After an injection of pituitrine
June 26th	9.00 a. m.	70	5.3	No injection given
June 26th	6.00 p. m.	100	5.1	No injection given
June 27th	9.00 a. m.	150	5.9	No injection given
June 27th	6.00 p. m.	90	6.2	No injection given

As can be seen from the table the usual increase in milk and fat was obtained at the 11 A. M. milking. At the 1 P. M. milking there was very little if any gain due to the injection, likewise after the injections at 3 P. M. and 5 P. M. there was no increase in milk secretion and the milk was no richer than usual. This leads to the conclusion that the mammary gland of an animal cannot respond with a liberal secretion of milk to any more than one injection of pituitrine given at two hour intervals.

Thinking that perhaps the repeated injections of pituitrine might alter its action upon the mammary gland or that a tolerance for it might be established, we continued our injections over a prolonged period and observed that an apparent tolerance was established in each goat. (Simpson and Hill[12]).

The goats were bred and taken to a farm for the winter. Shortly after their kids were born in the spring we resumed our investigations but found, somewhat to our surprise, that the tolerance established the preceding lactation period had entirely dis-

appeared and they were as responsive to the action of pituitrine as they had ever been. We injected at regular two week intervals through the entire lactation period to see if a tolerance would again be produced. The following tables and protocols give the results of this work.

The first experiment was started while the goats were still on pasture and were suckling their kids. They were milked while in the pasture, care being taken to remove all the milk possible from the gland. Immediately after milking they were injected with 2 c.c. of pituitrine and ten minutes later milked again. The results are given in the subjoined table. It must be borne in mind that both of these goats had established a tolerance for pituitrine at the preceding lactation period.

TABLE No. IV.

GOAT No. I GOAT No. III

	Goat No. I: Before Inject.		Goat No. I: After Inject.		Goat No. III: Before Inject.		Goat No. III: After Inj.	
	cc milk	% fat	cc milk	% fat	cc milk	% fat	cc milk	% fat
May 10	22	8.3	63	9.7	30	6.8	100	8.3
June 1	25	7.4	190	9.7	45	6.4	130	8.2
June 14	25	9.4	60	10.4	30	7.8	73	9.0
Average yield	24	8.4	104	9.9	35	6.9	101	8.5
Grams fat yielded		2.0		10.3		2.41		8.58

Since there was an average yield of 2.0 and 2.41 grams of fat from the milk obtained from the normal milkings in goat 1 and 3 respectively, while an average of 10.3 and 8.5 grams of fat were obtained immediately afterwards as a result of pituitrine injection, there can be no doubt that all previously reported tolerance for pituitrine had entirely disappeared. Table No. 5 gives the results of the continuation of this experiment on goats No. 1 and 3.

TABLE No. V.

GOAT No. I

Date	Before Injection		After Injection		Per cent of Increase	
	c.c. of milk	% of fat	c.c. of milk	% of fat	Total amt. of milk	Total amt. of fat
June 23	150	8.0	100	13.6	67	113
June 29	195	8.6	43	12.6	22	39
July 6	130	9.4	25	11.4	19	28
July 13	165	8.8	55	13.9	33	53
July 21	145	9.4	30	13.6	21	30
July 27	120	8.7	45	11.4	37	50
Aug. 3	105	8.8	40	11.8	48	51

GOAT NO. III

Date	Before Injection		After Injection		Per cent of Increase	
	c.c. of milk	% of fat	c.c. of milk	% of fat	Total amt. of milk	Total amt. of fat
June 23	135	8.2	135	14.2	100	173
June 29	120	9.8	45	12.2	37	42
July 6	75	8.8	35	11.3	47	60
July 13	110	7.6	45	12.0	41	65
July 21	95	6.6	65	13.0	69	119
July 27	80	11.2	40	12.5	50	56
Aug. 3	25	11.0	25	14.2	100	129

The goats were milked regularly at 9 a. m. and 6 p. m., and on days when injections were given they were milked at 6 p. m. and immediately afterwards injected with 2 c.c. of pituitrine and ten minutes later milked again. These milkings were always controlled with normal milkings when the same procedure was adopted except that no injection was given.

Hammond (loc. cit.) states that the mammary gland is more responsive to the action of pituitrine in early than in late periods of lactation. Our goats seem to give the best results soon after kidding but as table No. V shows there is no regular correlation with the period of lactation.

Goat No. I during our first experiments upon her, (7) responded to pituitrine injections until she was practically "dry". During this period a comparatively large amount of pituitary extract was given. She was bred and soon after freshening again the injections were resumed but without any positive response from her throughout the entire lactation period (12) although other goats responded positively when given the same extract. Why she should again respond so positively after once establishing an apparent tolerance for the extract is not clear.

Not wishing to confine our experiments to Angora goats which are normally poor milkers a half breed Toggenburg milking goat was obtained. Exactly the same procedure was adopted as was used in the preceding experiments. The following table gives the results of these injections. The injection periods were always controlled by normal milkings but to avoid unnecessary tables these are not given. The amount of pituitrine injected was always 2 c.c. given immediately after milking and followed in ten minutes by a second milking:

TABLE NO. VI, GOAT NO. IV.

Date	Before Injection		After Injection		Per cent increase	
	c.c. of of milk	% of of fat	c.c. of of milk	% of of fat	tot. amt. of milk	tot.amt. of fat
Oct. 30th, 9 a. m.	480	5.6	80	8.2	17	21
Nov. 1st, 9 a. m.	385	2.8	150	6.2	39	86
Dec. 14th, 9 a. m.	280	7.2	65	8.8	23	28
Dec. 14th, 6 p. m.	60	7.0	44	8.6	73	90
Dec. 16th, 9 a. m.	300	6.2	100	8.4	33	45

This table also shows great lack of uniformity and no direct correlation to the period of lactation. This goat never responded to the injections with the same degree of positivity that was shown by either of the other goats.

Cushing has shown that the feeding of pituitary bodies to growing dogs results in emaciation. Our goats toward the end of the third lactation period in which pituitary extract had been used began to fail in health. This was first noticeable in goat No. III. Whether or not this was due to the use of pituitrine I am unable to state. One would hardly think the amount we used was sufficient to undermine the health of the animals. During the entire period of 1915 goat No. III was not in prime condition and toward the latter part of the period about August she became emaciated and at times appeared in considerable pain. She was then on pasture but in addition was receiving all the hay and grain she would eat. In spite of this treatment she continued to weaken and on Dec. 20th died. A post mortem examination revealed a pulmonary infection of verminous bronchitis due to *Dictyocaulus filaria*, a parasitic disease quite common in goats and frequently fatal. Unfortunately the other organs were not examined.

Goat No. I was apparently in good health until about December 1st when she also started to lose in flesh. Her symptoms were similar to those experienced by Goat No. III except that she did not appear to suffer pain. Loss of appetite was one characteristic symptom but she also became stupid and sought seclusion and would spend most of the time lying down in some protected corner. She gradually wasted away and died in March. We thought that she had died of the same infection as Goat No. III but a post mortem examination proved otherwise. There was no pulmonary infection or any other evidence of *Dictyocaulus* infestation, but according to Dr. Goldberg, to whom I am indebted for the examination there was a marked degeneration of the pancreas and also of the

islets of Langerhans. The kidney also showed evidence of degeneration. These were apparently the only abnormalities that could have caused death. It is to be regretted that the pancreas of goat No. III was not also examined since with only this one example we would not be able to state whether or not the pituitrine injections were responsible for the degeneration noted.

IV. THE MODE OF ACTION OF PITUITARY EXTRACT ON THE MAMMARY GLANDS. There are three ways in which pituitrine might act in causing milk secretion. I. Because of its well known action on the arterioles causing their constriction, the blood supply to the mammary gland might be altered resulting in milk secretion. II. The action of pituitrine may be glandular in nature, the secretory epithelium lining the alveoli being stimulated by its use resulting in milk secretion. III. Many histologists believe that the alveoli contain in their wall plain muscle fibres capable of contracting and forcing out the milk contained within the lumen. If this is true pituitrine might act on these muscle fibres thus forcing out the residual milk that would not otherwise be removed by ordinary hand milking.

Mackenzie[9] has shown that the first injection of pituitrine causes a secretion of milk accompanied by an increase in blood pressure while a second injection given one-half hour later is followed by milk secretion and a decrease in blood pressure. These facts would seem to be sufficient to disprove the first mentioned theory.

The two remaining theories are well worth considering; there seems to be good evidence for each theory and as yet I do not consider either to be conclusively proven.

Schäfer[14], from histological evidence, has come to the conclusion that the action is muscular. Gaines[15] from physiological experimentation has arrived at the same conclusion.

Hammond[5] from his extensive researches upon this subject is of the opinion that the action is glandular rather than muscular. Simpson and Hill[16] have also produced good evidence that it is not muscular. Experiments were performed on two lactating dogs. They were anesthetized and an incision was then made into one of the mammary glands (the right of the posterior pair). The milk was led off to a drop recorder by a strand of lampwick placed in the incision, according to the method adopted by Schäfer and Mackenzie[2]. The drops were recorded on a moving kymograph and at the same time the blood pressure tracing from the right carotid artery was taken with a mercurial manometer.

With milk flowing regularly at the rate of one drop in fifteen seconds an injection of 1 c.c. of a 1% solution of barium chloride (a powerful stimulant for plain muscle) was made into the left femoral vein. This was sufficient to produce a distinct rise in blood pressure and a slowing of the heart rate but decreased rather than increased the secretion of milk in each experiment.

An injection of pituitrine after an interval of three or four minutes produced a decided flow of milk especially in experiment II in which the dog was newly lactating.

Since pituitrine stimulates milk secretion when injected three minutes after an injection of barium chloride it would seem evident that its action is not muscular. The criticism has been offered ([14]) that barium chloride may not be a stimulant for the muscle fibres in the mammary gland. Barium chloride is usually considered a stimulant for all "plain muscle" and has not been proven otherwise.

I have in mind a human subject who is nursing her third child. She is suffering from vaso-dilation and to tone up her blood vessels is taking twenty drops of ergot three times a day. After taking this dosage there is no secretion of milk nor any sensation that is associated with the secretion of milk. During a previous lactation period ([11]) this patient was given injections of pituitrine and never failed to secrete a copious supply of milk and experience a characteristic sensation in the breasts as a result of the injection. The action of ergot on plain muscle is also well known.

As has been previously stated pituitrine has an immediate excitatory effect which is followed by a decreased secretion below normal at the next milking period. Lactating goats that have ceased to respond to its galactagogue action giving no increase in milk secretion as a result of its use, still show a decrease below normal in the amount of milk secreted at the milking period following the injection. This would indicate an inhibitory action of the extract. Since there was no milk secreted as a result of its use the decrease observed at the following milking could not have been due to the withdrawal of milk that would have been obtained later.

The following table No. VII shows this effect in goat No. I: the injection was always two cubic centimeters of Parke, Davis & Co. pituitrine given subcutaneously immediately after the evening milking.

TABLE NO. VII, GOAT NO. I.

Date	Evening Milk				Next morning's Yield	
	Before inj.	After inj.	Total	% Fat	c.c. of milk	% of fat
Injection given immediately after evening milking						
July 15th	40 c.c.	5 c.c.	45 c.c.	7.8	50 c.c.	6.8
Oct. 1st	28 c.c.	2 c.c.	30 c.c.	8.3	45 c.c.	8.8
Oct. 16th	25 c.c.	4 c.c.	29 c.c.	9.5	30 c.c.	8.3
Oct. 20th	20 c.c.	2 c.c.	22 c.c.	9.7	25 c.c.	8.4
Average			31 c.c.	8.8	37 c.c.	8.1
Control milkings no injection given						
July 14th	45 c.c.	4 c.c.	49 c.c.	7.8	85 c.c.	7.5
Oct. 2nd	30 c.c.	1 c.c.	31 c.c.	8.2	45 c.c.	7.6
Oct. 17th	20 c.c.	1 c.c.	21 c.c.	8.6	40 c.c.	9.8
Oct. 19th	20 c.c.	2 c.c.	22 c.c.	9.1	35 c.c.	10.9
Average			31 c.c.	8.4	51 c.c.	9.4

On the four evenings when injections were given there was an average of 2.72 grams of fat secreted compared to 2.62 grams on the control evenings—an increase of only .10 gram per day which would have probably occurred without the injection. The average fat yield for the four mornings following the injections was 2.99 grams while the average yield obtained on the four mornings not preceded by an injection was 4.79 grams. There was an increase of only .10 gram and a decrease of 1.80 grams daily as a result of the injection, the decrease being fifteen times the increase.

The following experiment was undertaken to determine the effect on the next morning's yield of an evening injection of pituitrine without the subsequent removal of milk. The subject was a lactating goat No. IV. She was milked regularly at 5:30 P. M. and 9:30 A. M., and the injection of Parke, Davis & Co pituitrine (2 c.c.) given subcutaneously immediately after the evening milking. Table No. VIII, shows the results of these injections the morning following an injection period being starred.

TABLE NO. VIII, GOAT NO. IV.

Date	Morning Yield		Evening Yield		Remarks
	c.c. milk	% fat	c.c. milk	% fat	
Jan. 17	310	4.8	160	6.0	
Jan. 18	350	5.8	155	6.4	
Jan. 19	*275	6.6	170	5.8	*Inj. of pituitrine on previous evening
Jan. 20	350	5.8	150	4.0	
Jan. 21	*260	7.4	175	4.6	*Inj. of pituitrine on previous evening
Jan. 22	300	5.8	155	4.6	
Jan. 23	*350	6.8	140	7.0	*Inj. of pituitrine on previous evening
Jan. 24	345	6.4	150	4.7	
Jan. 25	*250	7.3	200	4.0	*Inj. of pituitrine on previous evening
Jan. 26	320	6.0	165	6.0	
Feb. 22	360	6.5	225	7.0	
Feb. 23	375	6.5	265	7.3	
Feb. 24	*275	6.6	245	7.3	*Inj. of pituitrine on previous evening
Feb. 25	385	6.3	185	6.7	
Feb. 26	300	6.5	175	6.9	
Feb. 27	*290	7.3	150	7.0	*Inj. of pituitrine on previous evening
Feb. 28	335	6.2	190	7.2	
Feb. 29	370	7.2	220	6.6	
March 1	*350	5.7	200	6.0	*Inj. of pituitrine on previous evening
March 2	390	5.2	230	5.4	
March 3	420	5.0	250	5.6	
March 4	*385	4.5	250	5.2	*Inj. of pituitrine on previous evening

By examining this table it can be seen that there is almost invariably a decreased secretion of milk on the mornings following an injection although no milk was withdrawn after the injection. The average secretion of milk on the mornings following injection was 304 c.c. while an average of 351 c.c. was secreted on the other mornings, an apparent loss of 47 c.c. of milk per day due to the injection. These results are difficult to explain if we assume the muscular theory to be correct.

V. SUMMARY AND CONCLUSIONS. I. The injection of pituitary extract into lactating animals produces an immediate secretion of milk even though the mammary gland was hand milked just preceding the injection.

II. The milk secreted as a result of pituitary injections has a super-normal fat content but the amount of milk and usually, but not invariably, the fat it contains is decreased at the next milking period. The total daily secretion of milk is only slightly altered by the injection of pituitary extract; there may be either a slight gain or a loss in the total amount secreted.

III. The mammary gland of a goat does not respond to more than two injections of pituitrine given at two hour intervals.

IV. If the injections of pituitary extract is continued for a sufficiently long period a temporary tolerance for its action on the mammary glands may be established. This tolerance may entirely disappear by the next lactation period.

V. Similar results have been obtained by the injection of pituitary extract into lactating cats, dogs, goats, cows and the human subject both as to the quantity and quality of the milk secreted and the rapidity of the response to the injection.

VI. There seems to be good evidence in support of both the glandular and muscular theories of the action of pituitary extract on milk secretion, the results of my researches would, however, lend themselves more to the support of the former theory.

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—Dr. J. R. Grigsby has removed from Ft. Collins to Wray, Colo.

—Dr. W. J. Stewart has removed from Oakland to Berkeley, Calif.

—Dr. V. W. Knowles of Marshalltown, Ia. has been transferred to Little Rock, Ark., in the service of the Bureau of Animal Industry.

—Dr. H. C. McKim, formerly of Pasadena, Calif., is now stationed at Remount No. 2, Fort Sam Houston, Texas.

—The address of Dr. Robert Graham of Lexington, Ky., will be changed to Urbana, Ill. after September 1.

—The next meeting of the Connecticut Veterinary Medical Association will be held August 8, at Lake Compounce, Bristol, Conn.

ITEMS IN RECENT HISTORY OF VETERINARY MEDICINE*

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(*Continued from page 526*)

Cases in Which Slaughter is Commendable. Even in the mild and non-lethal foot and mouth disease there are cases in which slaughter is imperative, as when infected stock has just been landed in a country that has been, and still is, free from this disease as regards its home herds. When a whole nation is threatened by a probable, prospective escape of the infection through winds, water, birds, insects, and vermin in addition to the grosser methods of transmission, prompt killing followed at once by complete sterilization, preferably by heat, is by far the best and safest course. Prophylaxis by the absolute exclusion of all animals susceptible to a given dreaded disease is still better. The age-long example of the Channel Islands is a lesson to the world which every country may well study and adopt. The unconscious exclusion of foreign stock by the Scottish Highlands, and other lands, is no less instructive. For a land infected only in a very limited area and where this has been, and can still be, completely isolated from surrounding territory, it may still be the wisest course to ruthlessly *stamp out* the disease in this way. But when the infection is spread over a wide area when the number of animals to be sacrificed is large, where the owners hold them at a sentimental value rather than a market valuation, where the government valuation is unduly low, and where the animals are yielding a large income to their owners that will be cut off when they are killed, compulsory slaughter is usually a serious tactical blunder and will bid fair to defeat its own purpose.

Mistakes of the Federal Government in the Last Three Great Outbreaks. This has been the error of the Federal Government in the three last invasions. In that of 1912 the exact source of infection was never certainly ascertained. There was evidence to show, however, that it had reached Boston in cow-pox virus imported from a country affected with foot and mouth disease. Dr. Tizzer of Boston in 1902, obtained from a biological laboratory

in Massachusetts some vaccine to raise cow-pox on a calf, but found to his surprise that the calf developed foot and mouth disease instead. The vaccine bore labels showing that it had come from Japan, where foot and mouth disease prevailed, and subsequent experiments later in another part of Massachusetts led to an identically similar result. There is therefore no reason to doubt that this was the real source of infection. The two diseases agree in that both developed on the skin a vesicular eruption, both have their seat of election on the skin, in the same genus of animal, they have almost the same period of incubation, the same duration, the same mild course and rapid recovery, and the same habitual absence of evil consequences. They can be easily produced simultaneously in the same system, and the inoculation of the serum from a vesicle will produce one disease, or the other, according to the stronger susceptibility of the particular subject. The malady had been smoldering in Boston and environs for a length of time (since July) but was only recognized by the Federal and State officials in November. It had, however, been long enough neglected to have extended widely in Massachusetts, Vermont, New Hampshire and Rhode Island. A rigorous compulsory slaughter and disinfection were put in force and the disease was finally extirpated in May, 1903. The dairymen who had been concealing the disease for a length of time before its official discovery were even more disinclined to report it under the rigorous measures adopted, and there were extensive losses in the herds, closely shut in with their manure, in close, often filthy buildings, so that complex infections were the rule, with *foot rot, ulcerated teats, mammary abscesses,* and *other infective troubles,* so that the owners lost heavily, and were finally glad to part with their cows on any terms. It was a repetition of the losses sometimes suffered in confined, unwholesome cowsheds in the large cities of Europe, usually cut short by a final surrender of the stock to the government. A more rational system, with a better hygiene for the cows, would have shown the normally mild disease, and greatly reduced the complexity and violence of the attacks. We would then have had an experience, the counterpart of the pest of 1870. The actual loss to the country in indemnities paid for diseased cattle when discovered would have been saved as a whole; in the absence of concealment there would have been little, if any, complexity in the infections and *pari passu* a correspondent absence

of complex and intractable diseases which in the concealed and closely confined animals caused loss of condition, milk, health, and permanent ruin of all that made them valuable for the dairy. The animals would have continued to bear a good and substantial value instead of having become worthless as well as dangerous. The very season (winter) was especially propitious, as it was in 1870. As it was, the outbreak lasted six months after discovery (ten months according to some stockmen and veterinarians, with a complete sacrifice of all infected and exposed dairy stock, and a complete demoralization and ruin of the milk trade for that length of time.

The invasion of 1908 manifestly came from a similar source. Its origin, at first enveloped in obscurity, was, by the admirable investigation of the Bureau of Animal Industry, from the books of record of the Buffalo Stockyards, showing the animals that had occupied the yards from which the infecting animals had been sent to Pennsylvania and New York herds, and, from the railway books and waybills, the sources from which all of these animals had been started by rail to Buffalo, and the shippers at such starting points, finally traced to a Michigan farm, where the first to suffer were a lot just returned from a biological laboratory where they had been hired for laboratory use. Here, as in Massachusetts in 1902, it was evident that the materials used in the laboratory manipulations had conveyed the *foot and mouth disease.* The delays, however, had given ample time for the diffusion of infection, had conditions been favorable. The first reliable report of the disease came from Dr. Pearson, State Veterinarian of Pennsylvania, November 9th; the first cases of visible disease in New York herds were seen by me November 16th, and the first clear evidence of the disease in Michigan reached us November 22nd. Inquiries in Michigan developed the fact that the herd first affected (reported) had had its disease diagnosed as *mycotic stomatitis* and as they must have been *apparently* recovered before they could be shipped to Buffalo at least two weeks or more must be added beside the time they spent in the laboratory. We have thus at least 34 days clearly accounted for during which the infections could have spread, since the history of the outbreak begins. Shipments by rail, in the interval, could be easily traced, but the one to Pennsylvania was alone in evidence. This latter was already traced by waybills to Northumberland, Montour and Lucerne Counties and had been taken care of,

There might still of course be infection from the highways over which they had traveled, but even this could be watched under quarantine. In New York the railway books and waybills showed nothing so that there was a probability that the missing cattle from the Buffalo stockyards had gone by highway, and this turned out to have been the case when they were hunted down in nearby counties. Here again, however, possible infection from the highways confronted us. County by county was quarantined wherever infection was discovered, suspicious cases outside the quarantined territories were carefully investigated, and the disease was safely circumscribed and extirpated before the end of the year. Several New York herds, that had escaped detection until they had passed through the disease and recovered, were saved from slaughter and kept rigidly shut up in their yards until there was no longer any danger, and at last liberated after thorough disinfection. It seemed a foregone conclusion that in this outbreak Ohio must necessarily become involved, as Michigan cattle are largely drawn into this corn-growing state for winter feeding. But the high price of corn led the Ohio farmers to turn their corn into money direct, and abandon winter feeding for that year, and thereby the state was saved from the plague.

The suppression of the *first* of these invasions (1902) cost the invaded states (Massachusetts, Rhode Island, Vermont, and New Hampshire) in compensation for animals killed \$119,917.00, beside the heavy outlay for professional supervision, disinfection and the many incidentals. The second for the three states (Michigan, Pennsylvania, New York and Maryland), cost in compensation for the slaughtered, \$90,033 and including supervision and needful outlays \$300,000.

A *third* invasion (1914) covered a much wider area, having reached 21 states and the District of Columbia. Its real origin has not been demonstrated. The Secretary of Agriculture thinks it may have been imported in a material used in a tannery at Niles, Mich., where the disease was first reported, and repeats a rumor to the effect that pigs belonging to employees of this tannery were the first sufferers. Had he named the suspected "*Material*" it might have given some color to the suspicion, but by omitting this he leaves his theory no better than a guess. It is perfectly true that fresh hides, or other part of an infected animal, or a hide that has been closely packed while yet green, could easily carry the virus. But

when he has not bestirred himself to secure prohibition of the importation of such obvious *fomes* we are left with the management of the disease which had sneaked in unawares at the opening we had so invitingly left for it. In August 1914, local veterinarians in Cass and Berrien Counties were dealing with a disease which they recognized as suspicious, and toward the end of that month they reported this affection to the State Veterinarian. The state official in his turn consulted a meat inspector of the Bureau of Animal Industry, at Detroit, and September 3rd, went with him to Niles to see the cases. They failed to diagnose these correctly, but sent some scrapings to the B. A. I. pathological laboratory at Washington. This laboratory failed to reach a satisfactory conclusion and temporarily adopted the diagnosis of *mycotic stomatitis.* September 24th the pathologist of the State Live Stock Sanitary Commission visited an infected farm and two days later, in company with the State Veterinarian, several other infected farms in the neighborhood. The pathologist now suspected foot and mouth disease and suggested telegraphing to Washington to send an expert. The State Veterinarian preferred to confine their inquiries for the present to the local office of the B. A. I. at Detroit. The pathologist took the specimens to Lansing and September 28th inoculated a calf. On October 1st this calf showed all the buccal lesions and symptoms of foot and mouth disease, but they still hesitated because the feet were not involved. On October 5th the State Veterinarian, the president of the State Live Stock Sanitary Commission, and the inspector in charge of the office of the B. A. I. at Detroit went once more to the diseased herds in Berrien County and the inspector now sent to Washington *a letter* describing the symptoms, which was received at the B. A. I. October 10th. The Bureau, which three weeks earlier had concluded from the examination of some scrapings that the disease was *mycotic stomatitis*, now woke up to the serious nature of the affair, inoculated some calves and sent an expert in haste to Niles. He decided at once on foot and mouth disease, but to support his diagnosis he inoculated some calves, which in due time showed the characteristic disorder.

The apathy, tardiness and lack of promptitude shown by the State Veterinarian, and the B. A. I. inspector when the national calamity loomed up before them is rather incomprehensible. The milk from the diseased cattle had been sent to creameries, where hogs were fed on the skim milk and sold in the Union Stock Yards, Chicago,

and from there to other destinations. It should surprise no one that when the B. A. I. inspectors got on the scent (October 17th) they found 46 infected herds in the suspected district around Niles. By October 28th the Secretary got around to the infected Union Stock Yards and promulgated a quarantine to take effect three days later (October 31st). An excellent measure to hurry out all infected and diseased animals to form newer and wider and more effective centers of multiplication and spread of infection before the gates were closed. Hay was included in the earlier quarantine, but by November 7th, the thoroughness and efficiency of the order must be again impaired by allowing the movement of hay which was allowed if cut before August 1st, on affidavit of the owner or consignee. Even hides and skins from the quarantined area, can be moved interstate when accompanied by an affidavit showing that they had been removed from the body before August 1st, 1914 (the *assumed* date of the 1st case), while foreign hides and skins can be moved interstate but must be accompanied by an oath in the same way. This is akin to the rules in Europe to prevent the movement of infected cattle and things. Such rules were overridden whenever a burgomeister (a layman) judged it safe to relax them, and the meat from suspected or even diseased animals was admitted to the *freibank* or other low-grade market when the head and feet had been removed. Even in England quarantined animals were allowed to pass over the public highways to slaughter, when the local inspector, often a policeman or other non-professional person, granted the privilege. It was from the experience of these lands, that we had adopted the absurdity that this disease could not be controlled by quarantine (See Author's "***Report to the Commission of Agriculture of the State of New York," for 1910, pp. 303-326***). We flatter ourselves that in this enlightened age we take science, reason and judgment for our guides, but man is still too apt to forget all three, when the unscientific past is in authority, though such authority is antiquated and should be abandoned.

The compulsory cessation of all movement from herd to herd, or from place to place, making this cover a sufficiently wide area, the exclusion from the quarantined place of all animals and men, from outside, who might carry infection, including all birds, vermin and flies, the shutting in of all products of animals susceptible to the disease until sterilized, and the suspension of all intercourse of human beings inside the quarantine and those outside, will and

must stop all infection and speedily stop all reproduction of the infecting material. This quarantine must be thorough and effective; there can be no relaxation nor exceptions; everything must bend to the absolute necessity of the extinction of the germ. Efficiency depends on thoroughness and no rule on paper only, however widely posted and glaringly displayed, can meet the case unless rigidly applied both in spirit and deed. It need not be long continued in this disease, if applied in force and firmness, so that there is no serious outlay nor loss, and what little loss there is, is overcompensated in the saving of affected herds and its speedy restoration to usefulness and profit.

The greatest error of our American sanitary administration in this malady is in the *compulsory slaughter*. As we have already seen, *compulsory slaughter* has its proper place, and is indispensable when needed, but as an uniform system, in a widely distributed outbreak, it has proved a failure. It does not take sufficiently into account the effect on *human nature*. All stock owners are not necessarily philanthropists, nor even patriots of a socialistic type, who are ready to suffer heavy personal loss for the good of the community and nation. They see that this disease is neither fatal nor prolonged, that all recover and almost all are restored to usefulness, and in their recovery there has been secured for each an immunity for five months at least, so that they run no danger of a second attack, that the fodder and litter laid in for winter use can still be fed to *them* instead of sacrificed like themselves and all their prospective progeny. Need we wonder that such owners should look upon the killing as an altogether unnecessary loss, not present alone, but going on into the distant future as well. If the owner has been building a herd of special animals, it may be of a high breeding value, but certainly precious in their proven adaptability to the needs and demands of critical and exacting customers, to the management, food and water of which he is himself trained to supervise, when the owner has been at much trouble and expense to eliminate from the herd diseases that would disqualify their victims for use in the dairy, need we wonder if he resents the whole unreasonable procedure, that a disposition to revolt arises in his mind, that he should be tempted to conceal his infected cows through the few days of real illness, and preserve to his family the living that he has been at great pains to build up. It cannot be answered that the killing of one animal is to save the remainder of his herd,

for in this disease the infection of one means almost of necessity the infection of every animal in the herd. It cannot be said that the infection cannot be confined to the one herd, for all experience has shown that in different premises where *isolation* is assured the virus need not be carried from one to the other. On the Scottish farms already quoted there was the invariable experience that a reasonable seclusion was always successful. *Compulsory slaughter* is an economy in the case of a herd imported and only just landed in a plague-free country, but where foot and mouth disease has already become widespread and the citizens of many states have to be persuaded to yield up their property, their source of living, and their attached and well satisfied customers, whom they could count on for continued support it is different. *Compulsory slaughter* is an untactical and impolitic resort, which cannot fail to make antagonistic a large body of citizens whose conciliation is the surest road to success. That it has aroused the opposition of a large number of citizens is undeniable, in each of the three last outbreaks, and that that opposition has led to a prolonged duration of the epizoötic and an altogether unnecessary outlay is as clear. During the campaign against the disease it would have been impolitic to say this; it would simply have increased the confessedly great dissatisfaction, and any practical movement against the wrong even if successful, could but have hampered the officials who had the *legal* right and duty to act, and delayed the extinction of the disease and deliverance of the country from the impending calamity of a general infection. The duty of dealing with it was reposed by Congress in the Department of Agriculture, the mistaken and wasteful courses which this department followed would succeed in the long run if it could be maintained, but only at the cost of a prodigal outlay of money, and the undermining of much of that loyalty on which the life of the nation depends. Now the case is different; we are informed that the plague has been exterminated, after a fight of two years instead of a career of a little over two months in 1870 when left to the good will and purpose of the stockowners, and at a cost spoken of as several millions indemnity in addition to the permanent sacrifice of many very valuable breeding cattle and their otherwise prospective progeny.

The whole herd cannot always be saved. The animals with irremediable and chronic, necrotic deposits internally must still be sacrificed for the common good, and many epithelial growths must

be excised or otherwise disposed of and their bases sterilized. Here as elsewhere the work must be radical so as to make a complete end of possible infection. Many parasitisms will also require remedies, or, if beyond this, the hosts may have to go to the block. But let it once more be urged that the preservation of the present and future bovine animal must never be taken as a license for the slightest shadow of laxity in the quarantine. The stock in the quarantine area must be entered in a census with ages, breed, markings and other indelible means of identification, and kept under heavy penalties away from public highways, and exposed lots, the herd to be forfeited if any one is missing or if quarantine is violated in any way. Conciliation for the law-abiding, and punishment severe and unfailing for the violator is the price of success.

HOG CHOLERA. No *animal plague* is more widely spread in the United States than *hog cholera*. No one takes yearly a heavier toll of deaths from our food-producing animals, and I may say none is more familiar to the farmer of the middle west, and none more dreaded. We can find suggestions of its existence in Europe centuries ago but only in the indefinite form of a *fatal epizoötic in swine*. The lack of identification may be explained on the ground that swine diseases received little attention as compared with the plagues of the more valuable domestic animals; veterinary medicine was very crude and uncertain; swine listed as unclean in the Jewish code was anything but a favorite, even with the Christian, and was comparatively seldom bred and kept in large herds. In 1817 swine suffered under a deadly epizoötic in Great Britain which cannot, however, be clearly identified. Fifteen years later such scourges were common—the swine industry had grown to much greater dimensions. It was said to have been exported in 1832 to America where the pork industry was much more in vogue, and since then it has been a constant pest. At first it was rated as a single disease and was referred to under a variety of names,—*measles, erysipelas* (*red disease, rouget, Rothlauf, scarlatina*), *purples* (*blue sickness*) *carbuncular fever, typhoid fever, pig typhoid, typhus, gastro-enteritis, diphtheria, cholera,* etc.

The *swine erysipelas* was the first to be distinctly set apart on account of the extreme redness of the skin, and, on the advent of bacteriology the distinction was endorsed by the discovery of the constant presence of its straight, non-motile, bacterium quite unlike the *actively motile bacillus* of what is now called *hog cholera*. This

last was discovered by D. E. Salmon and Theobald Smith and long accepted as the pathogenic cause. Smith distinguished seven varieties from different outbreaks of varying virulence and severity. Then came the discovery by Loeffler and Schütz of the non-motile, minute, *Bacterium of Schweinseuche* in the *pneumo enteritis* in which the lungs especially suffer. It must be added that M'Fadyean found the motile bacterium having the pathogenic characteristics of the hog cholera germ and the cultural features of the *pneumo enteritis* one; also that Reitsch and Jobert in a hog cholera outbreak at Marseilles found a bacillus longer and thicker than the hog cholera germ, staining in poles and souring and coagulating milk. Thus we had a dozen different microbes representing a dozen different infections and maladies that had formerly been classed as one. Then came Dorset, Cotton and McBryde with the demonstration of an invisible, filterable germ which escaped through both the Pasteur and Berkfeld filter, yet proved more certainly infectious, and caused more redoubtable lesions than did the already recognized germs found in that disease. This, however, still failed to close the list. In certain characteristic outbreaks there were constantly found the *spirochete* making a full baker's dozen of different infections without counting complex cases in which two or more of these germs were present at once, and those in which still other different germs must be admitted as complications. It is now generally understood that the ultravisible organism is the most important pathogenic agent of the whole. This should be borne in mind when we come to consider the prophylactic measures in current use.

The *spirochete* is set down as a *protozoan* instead of a *bacterium,* and may, like some of that class, be closely related to the ultramicroscopic and *filterable germs,* so that the recognition of its occasional presence may serve to reduce, in place of increase, the number of real pathogenic organisms, to simplify instead of further complicating the problem in hand; but this is still in the field of speculation and by no means proven. It may be said that we can resort to the *complement fixation, agglutination* or *precipitation* tests, but these are laboratory resorts and quite beyond the average practitioner in the field. Moreover we are here in the presence of an *ultra-visible germ* likely therefore to defy the manipulations of even the laboratory. With the *visible* or *microscopic germs* the case is different. The old resort of inoculation of a susceptible ani-

mal remains the most available field resort for the practitioner. But even this is often too expensive or too difficult. It may be impossible in an infected district to find susceptible animals remaining. If they are to be found, more likely than not, they belong to a breed so carefully guarded and of so high a value that it is impossible to secure them.

The *diagnosis* is usually based on a sudden and rapidly increasing mortality in sucking or weaned pigs, in a herd that has just received an addition from without, or that has wandered out of its usual boundary, that has had a sow recently sent to be bred, that has had a new attendant with unwashed clothes, or that has been fed kitchen refuse with uncooked fragments from bodies of pigs, that has been visited by butchers or drovers, by buzzards or other carnivorous birds, or that drink from a stream passing through pens higher up. If the first sufferers have been those that have temporarily left the herd; if they have hot snouts and ears, refuse food, seek seclusion, are costive or scouring, or in chronic cases if they become unthrifty and pine, and if, after death, they show inflamed bowels, with projecting, circular, necrotic ulcers in the ileum, cecum or colon the genuine hog cholera type may be accepted.

Treatment is inadvisable. Even apart from the high mortality, the continuous succession of cases, so long as susceptible animals remain in or come into the herd, or are born into it, makes the preservation of the infected a losing resort. In Great Britain the whole herd is killed and the place disinfected and this radical resort is as fully justified as in the case of *rinderpest* or *lung plague*. In America on the other hand we have fallen back on *immunization* by *inoculation*. When the question is on preserving a herd that has passed through the disease and has thus become immune, or even that has been immunized by artificial means it is always needful to take into account all the possibilities named under *foot and mouth disease* in which the survivor may still carry the germ for a greater or less length of time and communicate it to the susceptible animals which may come into too close proximity with it. All such infection-bearing cases should be removed from the herd that is to be kept.

Prophylaxis. The old and entirely unobjectionable method of keeping a herd pure, is as feasible today as it ever was. Have pigpens constructed of salt glazed brick, walls and floor, with non-ab-

sorbing mortar, and proper drainage into cesspools kept disinfected. Have the brick partitions high enough so that inmates of adjacent pens cannot come in contact. It is well to have not more than 3 pigs in each pen so that infection accidentally entering one, can be promptly *stamped out* without endangering the whole herd. Start with a sound herd, from a sound herd, guarded against any chance of exposure in coming to their new home. See that the water supply comes from a pure and unquestionable source. Breed from your own sound herd only. Let no sow leave your herd for service, and no boar be hired, exchanged nor borrowed for service in your herd. If fresh or superior animals are wanted, for improving the home herd, see that they come from a herd that has long been absolutely sound, uninoculated and unexposed in any way, and to avoid contamination in transit keep the new arrivals in quarantine for at least a month under a separate attendant, at a safe distance and under the closest supervision. See that all their food and litter is raised on your place apart from all swine, or that it comes from a place similarly protected. Send no animals off the premises to market or fair to be again received back into the herd. If your herd is superior to all others, be satisfied with that, and with the extra returns that they bring, on account of such higher quality, and reputation for unquestionable soundness. Butchers, pig-buyers and others must not be allowed in the pens, nor to handle their occupants. Kitchen slops and scraps are sources of the greatest danger, if pork or lard from outside the farms has been used for cooking. The same remark applied to tankage and other products of packing houses. These may have been subjected to a sterilizing heat, but the killing house is liable to frequent infections and the accidental conveyance of virus into a sterilized product after heating, not at all impossible. The common use of swine for consuming left overs, scraps, carrion, and all that would otherwise go to waste is virtually an invitation to develop any disease within reach and to which the genus is susceptible. The rational way to meet this is to abandon this kind of diet. Apart from organic and inorganic poisons, such food may usually be utilized if sterilized by heat under such rigid precautions as will exclude any possibility of contamination.

IMMUNIZATION. In approaching the subject the most important thing is a protest against all thinking which is obscure or indefinite and all words or names that are equivocal or susceptible of

two meanings. In our best writings, veterinary and medical alike, we confront the words *vaccine, vaccination, vaccinated,* which according to *philology* mean, if they mean anything *pertaining to the cow, inoculating from the cow,* and *immunized by inoculation from the cow.* The root word is *vacca* a cow, and a whole family of words are lawfully begotten from this—*vaccinia* or *variola vaccinae,* cowpox; *vaccinate* to transfer cowpox by inoculating with the exudate of cowpox vesicle; *vacinifer* the animal (child or heifer) on which cowpox is cultivated; *vaccine* farm, the premises on which vaccine virus is raised on heifers or calves; *vaccin-style* or *lancet,* the instrument on which the cowpox virus has been dried up, to be used for scarifying or abrading the skin in *vaccination.*

All such words have so far followed the laws of language and retained their own proper, and original meaning. Each retains its original, definite, unequivocal meaning and it cannot be safely used with any other significance. Each is well born, legitimate, and true to its birth; it cannot be used to convey a different meaning. But how vilely has the pure name been befouled? *Vaccin* is now used to mean an agent that is supposed to protect a subject against any communicable disease and in doing this has parted company with its legitimate organ *in the cow,* and may have been drawn from any living creature having no relationship whatever to the cow, and from any disease of cow or other animal, however widely removed from the bovine family. It is even applied to the products of microorganisms of any given disease and occurring in any animal whatever, having not the remotest relationship to the cow. The term *vaccination* has been made to do duty for *immunizations,* no matter by what this supposed *immunization* has been brought about. In short our word *root* and *branch* has been set apart from all that was clear and definite in its meaning, and now bids fair to become a *waif* among words with no definite meaning, but with unlimited power to puzzle the reader and to befog the mind. We have all heard the response to the question "*Why does the priest pray in Latin?*"—"*because it is the only language the devil does not understand.*" May we not well suspect that the enemy understood only too well this little group of Latin words begotten and born in one of the greatest boons that medicine has given to humanity, *Jenner's inoculation for small pox,* and that, none too well pleased with Jenner's gracious benefaction, he is now doing his worst to becloud its radiance and load the idea with uncertainty and infamy.

The terms *bacterins* and *serums*, are open to the same objections of *indefiniteness* and *ambiguity*. The best *bacterins* are the solutions, or extracts from the *killed bacteria* and can hardly amount to more than the *toxins* which are the immediate factors in producing the pathogenic symptoms and lesions, together with some *antitoxins* and other *antibodies*. The real protective action consists in the fact that they stimulate the polynuclear and other leucocytes and phagocytes to develop the *defensive materials*, but for the production of these time is required. They are therefore of small avail as curative agents: the potency of their action is prophylactic. Moreover if used on an already infected animal the addition they bring to the toxic element, will, in a severe attack, tend to sway the balance against, rather than in favor of recovery. The benefit received therefore can be mainly in very mild cases in which there was good prospect of recovery without their aid. *Serums* are a good deal characterized by the conceded indefiniteness of the word. It is naturally associated in the mind with the serum of blood but to be of any material value in this disease it must have been drawn from an animal that has recovered from this particular disease, and, better still, one that has been repeatedly *injected with small non-lethal doses, until it has become immune* and will no longer react to another dose. This serum contains, in large amount, the *defensive materials* of this disease and will therefore tend to a promptly *therapeutic action* on the system. It will act in this way in ratio with the amount of the *defensive materials* which it contains. In moderate cases of the malady it will usually assist greatly in recovery. In the more severe it will too often prove unequal to the task and the animal perishes in spite of it. But we cannot be sure that this serum will not retain a small amount of the *toxins* and even of the *microbes* from which the malady sprung into being. If therefore the inoculated animal survives, there has occurred a limited production of *defensive materials* and the leucocytes once started on this good work will continue to carry it on more or less. The result has been called *passive immunization*, and the period of its sway will vary from the time necessary to bring about recovery in the inoculated animal, to the *immunization* for a number of months and upward.

The drawbacks to the practice are evident on the surface. In infected herds a variable number perish though *serum-inoculated*, the death dependent on the virulence and potency of the germ then

operating in that locality, on the difference between this germ, or the germs, and those employed on the animals used to make the serum; and on the conditions in which the inoculated animals live. We cannot shut our eyes to the fact that though the gravity of the malady may be usually due to the *ultra-visible, filterable germ,* yet the numerous other microbes that in different outbreaks modify the nature of the malady, giving a definite character to each outbreak cannot always be fully met by the defensive matters in this particular brand of serum, lacking it may be in the most essential element which dominates in a given outbreak, and thus failures are to some extent inevitable. We have long known that the fatal swine fevers are not all simple and exactly alike, and we cannot trust that the *immune-serum* made for the country at large, at a distance from a particular outbreak, will exactly meet the demands of that outbreak. Then again the use of an *immune serum,* however good, even for this outbreak before us, never quite arouses the defensive powers of the leucocytes, as does a genuine non-fatal attack of the same brand of the malady, as is now prevailing. It was such failures as these that drove Dorset, McBryde, and Niles to the adoption of the *simultaneous* method in which a large dose of the *immune serum* was injected on the one side and a minimum dose of the *unaltered* virus of the prevailing disease on the other. A reaction is caused, but the disease is mild and deaths rarely occur. It is a resort to nature's own method of immunizing, but is liable to the same objection, namely, that it is a multiplication and possibly a distribution of the germ and of the disease. We have long been aware that the best that *immunity* can do is to give a *strong resistance* to an invasion of the same germ again, and to the production of the disease anew in the same system. This we can be reasonably assured of, but we cannot be assured that the disease-germ will be definitely killed, nor prevented from survival in the *immune system,* nor that it will be placed beyond the power of leaving that system to invade other and more susceptibe animals. *Carriers* of this kind have been long known in *typhoid fever, tuberculosis* and other diseases in man and even in this *complex hog cholera.* The recovered subject itself becomes *strongly* insusceptible to another acute attack, but other more susceptible subjects, living with him can contract the disease from him in, it may be, a fatal form, but in any case in a form that will extend pestilentially among the non-resistant. The inoculated are saved, the unin-

oculated on every side fall the victims. Our *inoculated soldiers* are truly *immunized*, the *uninoculated* citizens where these military men carry on successful war fall the victims. Similarly in *tuberculosis* the selected mild and slow cases, sent to the preventorium, or asylum, and to an open air life, have the disease checked, it may be apparently cured, and are then sent back to their city homes to propagate the disease *now latent in them*, among their predisposed families and to prepare a new lot of candidates for open air treatment or for the grave as the case may be. Trudeau is a striking example of this survival; he improved in the Adirondacks air, and spent the remainder of his life there in helping others, but finally died of tuberculosis in the lauded Adirondack hills. Our open air sanitaria are good so far as they go, but they do not go deep enough, nor far enough, to completely circumscribe and exterminate the germ, and thus they all come short in their result. We can do better in the lower animals where we are not restrained by a sense of the sanctity of human life. We can *stamp out* rinderpest, lung plague, foot and mouth disease, rabies, glanders, sheep-pox, Texas fever, tuberculosis, Malta fever and a host of other pestilences, and the medical sanitariums, if fortified by a sense of their duty to humanity of the coming ages, could *stamp out* tuberculosis in man, not so rapidly it is true, but not less surely if they would rise to the occasion, devote themselves to prevent the diffusion of the germ as they now do to the check of the rapid progress of the affection.

In *hog cholera* the simultaneous injection of the *defensive matters* and the *virus* is in the main a bid for a wider diffusion of the *disease-germ* and no candid mind, after surveying the whole field, can fail to associate the unprecedentedly wide practice of this method and the altogether unexampled extension of hog cholera. I do not desire to detract one slight iota from the brilliant record of Dorset, McBryde and Niles, but in their failure to see the matter from all sides, they have made the Bureau of Animal Industry and a great body of the veterinary profession the main disseminators of the infection; they have seeded a field, wide as their United States, in which hog cholera in its varied forms may find a congenial home for all time to come. With a property of 68,000,000 hogs valued at $571,000,000 and a correspondingly large yearly increase in pigs, the field is almost beyond limit, and the value of the method, great as this concededly is, in saving the race

through the present generation, will not bear mention, in comparison with the enormous losses yearly entailed on the nation for all future time. It is useless to plead that, under professional direction, this fabulous loss can be prevented, the condemnatory evidence is before our eyes, distributed all over the land, wherever swine are raised, and while he may close his eyes who will, this evidence will continue so long as we persist in distributing the virus by law and *misnamed* sanitary methods. If our methods must be limited to *mere remedies for a disease universally prevalent,* if we cannot extend our mental horizon to behold the incomparably vaster field of the great future, with all its limitless possibilities for good and evil, the human race has already, and often, surmounted greater barriers and has outlived them, but has it reached the status which has been set for it? Let us compare the progress of the last fifty years of free thought, opening up scientific light, and earnest striving, with all the available and rapidly developing helps of this now breathlessly evolving world, and say whether we, with the greater future still before us, can afford to ignore our highest coming prospects and content ourselves with the scraps of an increasingly decadent past. If we persist in literally cultivating some of the greatest evils of the world and putting away from us the proffered good, shall we not come under the condemnation of the greatest, and noblest leader that humanity has ever had. "Therefore I say unto you, The Kingdom of God shall be taken away from you and shall be given to a nation bringing forth the fruits thereof." Our portion of God's universe given us for a lifetime on this earth, is ours if we bring forth the good fruit, not if we accept and favor the evil. This *simultaneous method* of holding in check, for the existing generation only, of a great evil, has concealed in it the seed of a far greater crop of evil for those that come after us and it is for us to secure for them this harvest of good, or, to sow for them a prospective crop of never ending harm.

This *simultaneous method* has already been commercialized, and its predecessor *cowpox-vaccine,* to use a tautology here necessary, has already produced its natural evil fruit in our outbreaks of foot and mouth disease in Massachusetts and Michigan, and it has itself, through its *serum and virus* scattered the same infection widely in the west in the past two years. Commercialism in this matter has already had its chance and has been found woefully wanting. The licensing of the commercial factories by the Fed-

eral Government has flaunted before the eyes of the world that even national authority is impotent to prevent this gross evil and wrong. Even our own profession has been drawn into a subserviency to and co-operation with the wrong, and its concurrence has been insidiously sought by the promise of larger practice and better income. Finally the stockowner has been drawn into a questionable copartnership. He has a large herd of swine, more or less ready for market, and the hog cholera infection has come into dangerous proximity. Delay threatens to bring a complete loss, so he has the herd subjected to the *simultaneous method* of protection and, in a few days, ships them to a large public market making use of cars, roads, pens and yards where other store hogs are to come immediately after them. Every hog of them has been charged with the virulent infection, but this herd is safe, let other stockmen, herds and states look to their own protection. The others can, it is true, subject their hogs to the same protective treatment. But every new herd, so treated, increases the number of *infection-carriers*, turned out at large and ready to spread the seeds of the disease wider and wider.

The testimony of serum-manufacturers, and even of veterinarians, is usually strong in denial of any infection from inoculated hogs, but close questioning will mostly bring out the admission that a certain number of the inoculated animals die and it is by no means a fact of yesterday only that hogs that have recovered from the disease, caught in the usual way, have become, for a time at least "carriers", and have transmitted the infection to susceptible subjects. These facts are beyond dispute, and putting the two together the conclusion is inevitable that the animal that bears the germ, however healthy such carrier may appear, can transmit it to the vulnerable. It is not requisite that we show that all recovered or inoculated animals can do so, nor the exact period for which the infection may be given; it is enough to show that some carry it and for a considerable period, to shut out the method from indiscriminate or general use. The single germ, started in one vulnerable subject, increases rapidly, by myriads, and there is no limit to the infection distributed. The limit becomes one of receptivity only, so that the *method* that will distribute a few germs only, is one that should be debarred from general adoption, or for use on animals that cannot be guaranteed complete seclusion from vulnerable stock, for a length of time. Filtered serum even is inadmissible. Large microorganisms can be passed through

even a fine filter if time enough or pressure enough is used; how much more then the ultramicroscopic, unstainable and undemonstrable.

Dorset and Henley's Clear Sterilized Serum. It is encouraging to see that Dorset recognizes the imperfections of the serums in use and, in collaboration with Henley, has produced a "*clear and sterilized hog cholera serum*" devoid of erythrocytes and contaminating ingredients but retaining all the antibodies of the blood. This is a recognition of the undesirability of the existing method and a step toward the ideal condition of getting *altogether rid* of every living germ of the disease, and trusting to the antitoxins, and other defensive bodies—alexins, agglutinins, phylaxins, bacteriolysins, cytolysins, opsonins, precipitins, etc. The ideal, I need not add, is to exclude from the immunizing agent every living germ that may by any possibility become the starting point of an outbreak. It is a sorry recommendation of a prophylactic to say that under unfavorable circumstances it may become the centre for a new dissemination of the disease. It is no fair argument to say that the prophylactic which endangers infection, gives a stronger immunity in case of recovery. The same is even more true of the disease itself contracted in the ordinary way, and for exactly the same reason—the animal prophylactically treated has in reality passed through the disease, and its protective machinery has been set in motion to build up an effective barrier against a second attack. The same protection can be had by passing the whole herd through the disease in a mild form. For the good of the state and nation this is forbidden in all advanced communities; how much more should the official distribution of live pathogenic germs be interdicted even when done under the mask of sanitation.

And yet I read in Hoare's "*Veterinary Medicine*" (1913) the following under *Swine Fever*, p. 549 "*The carcasses of mild chronic and recovered cases often present a normal appearance, and there is no reason why they should not be consumed. The disease is not communicable to human beings.*" But what of swine, and of the uncooked kitchen scraps fed to them? If canned under heat—sterilization, the meat could be safely sold, but not otherwise.

When permissible and desirable to deal with *hog cholera* and its complex forms, by *immunization* (rather than by speedy de-

struction and thorough sterilization) *the living germ* should be completely discarded, and the agents that are completely sterile should alone be employed. Even *hyperimmunized serum* may be unsafe, since recovered hogs, or those that have been *strongly immunized* may be carriers of the germ though not themselves any longer susceptible to it. They may be *insusceptible to the disease,* and yet *carriers of the germ* which *can infect the susceptible. Hyperimmunized serum* in some cases may be entirely destitute of living germs, but it may in others retain some and prove thus unsafe and dangerous to use in premises into which susceptible animals can come. If it is *completely sterilized by heat* it can transmit no living germ nor disease any more than bacteria can when *really killed by heat.* If both these agents have been heated to sterilization they can be used together, the bacteria introducing the toxins, which *start the defensive cells into active production of defensive matters,* while the *serum of the hyperimmunized brings in the various defensive matters* ready made. The *killed bacteria* may be dangerous in *infected animals* or those *sick with the disease,* as, in large doses they may carry such a large amount of toxins as, along with the toxins produced by the germs already present and multiplying in the system, they may contribute to produce a dose that will be toxic and fatal. They kill, however, by increasing the amount of the *non-vital chemical toxins* and not by infection. If both are thoroughly sterilized they will carry no living organism and cannot add such living organism to the animal operated on, nor to another animal which is still *unimmunized.*

As early as 1880 I secured immunity by injections *subcutem of the heat-sterilized virus* and though the animals operated on did not always thrive well for some time thereafter, yet they resisted exposure to infections as do hogs that have passed through the disease and recovered. (Dept. of Agri. Report 1880, pp. 515-9. The same method I have often employed since in other diseases with good results. Reason suggests this treatment and experiment justifies the logical use.

When the *simultaneous method* is used it is prohibited in sucking pigs, cows approaching parturition, and any animal that is already infected or sick. I would add that so long as it can become a means of spreading the infections it ought not to be used at all.

(*To be continued*)

MANURE DISPOSAL AS A FACTOR IN THE CONTROL OF PARASITIC DISEASES OF LIVE STOCK

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The results of the work on hookworm disease of man in the southern United States and elsewhere in the world has emphasized the major importance of sanitation and especially of a proper disposal of feces as a control measure for this disease. Not only hookworms, but the other worms parasitic in the digestive tract and its adnexa in man, depend on the feces first of all as a vehicle for their transmission. But this is equally true for the parasitic worms infesting our live stock and domesticated animals. The eggs or larvae of stomach worms, nodular worms, ascarids, *Strongyloides*, whipworms, tapeworms, flukes and even lungworms pass first to the outer world in the manure, and a proper disposal of the manure is the first line of prophylactic attack.

While the importance of a proper disposal of feces has been emphasized and is being emphasized as a control measure for such parasites of man as the hookworm, the proper disposal of manure as a control measure for a large number of important parasites of live stock has not been adequately emphasized. Yet the fact is that this point deserves special consideration. Our live stock is constantly exposed and re-exposed to parasitic infestation by virtue of the fact that these animals eat off the ground, so to speak, to a great extent. Our horses, cattle, sheep and goats graze on pastures, our hogs root up the ground in search of white grubs and hunt through swampy pig-pens for the corn which is dumped into the mud, our chickens pick most of their food off the ground or out of the soil, and even our dogs, as a rule, seem to think as much of food that has been tossed out in the back yard as of food presented in a clean utensil. This mode of feeding exposes the food of these animals to contamination, since the feces of the animals are deposited on the ground, and the area in which the animal habitually spends its time is the area in which it feeds and which it contaminates. The prevention of this condition is for the most part impossible. The prevention of parasitic infestation as a result of this condition is a matter that calls for repeated treatment with suitable and adequate anthelmintics, thereby cutting down the

supply of worms in the animals and so shutting down egg production at its source. Vigorous measures along this line may be expected to render the manure reasonably safe on the score of parasitic infestation, since parasite eggs must be produced in large numbers in order to permit of perpetuation of parasites under the operation of the laws of chance.

But while the manure deposited on the pasture is not a thing that can be readily controlled, the manure from the barns and other buildings where domesticated animals are housed is something that can be more or less controlled. Contrary to the general rule for human feces, barnyard manure must be utilized as fertilizer, which means that it must go back to the fields somewhere. Now if the animals furnishing this manure were never on pasture and were always fed from clean troughs and racks, they would tend to lose any parasitic infestation they might have, the manure simultaneously tending to become free from parasite eggs and larvae and safe for use on the fields anywhere so far as parasites were concerned. I have seen old horses which had been used in a large city and kept off pasture which had almost none of the strongyles of the large intestine which are so common in horses as a rule, and sheep raised under experiment conditions which were almost free or completely free from stomach worms. But the farm animal from which barnyard manure or stable manure is obtained is usually only a transient in the barn or barnyard or stable. These animals are in the pasture every day or a part of the year, and the barnyard or stable manure is usually as infective to begin with as is that on the pasture.

There are two obvious lines of attack in disposing of the infective features of this manure. One would consist in treating the manure in such a way as to kill the parasite eggs and larvae, and the other would consist in disregarding this feature and placing the manure where it would have little or no capacity for infecting stock.

The first method offers a field for a large amount of investigation, but this investigating has not been done. Broadly speaking, one would have to determine how long the eggs and larvae of the various species of worms involved lived in manure piles, in spread manure, in closely packed manure; the effect of sunlight; the effect of moisture; the effect of various chemicals, the chemicals in turn being of a nature not to injure the fertilizer value of the manure. There are practically no data on this and little could be surmised without such data.

The second method is one concerning which we have adequate data. It merely involves the application of facts which are fairly well known, but which have received little emphasis in this connection. We have emphasized to a certain extent the value of stock rotation on pasture as a control measure for parasites. We know that if a pasture has one kind of stock on it year after year it becomes highly infested with the eggs and larvae of the parasites which infest that kind of stock. We might state this briefly and alliteratively as follows: *Permanent pastures perpetuate parasites.* Such pastures are dangerous—for that kind of stock. They may be quite harmless for other kinds of stock. Thus horses may safely follow swine or follow ruminants (cattle, sheep and goats); swine may follow horses or ruminants; ruminants may follow horses or swine. These groups have worm parasites which in general are not transmissible to each other, so that the manure from one group is not infective for the other groups. The fact that all the ruminants are infested with the deadly stomach worm makes it undesirable to attempt to rotate cattle, sheep and goats with one another.

But the extension of this idea of stock rotation to the disposal of barnyard manure and other manure has not been emphasized. I do not remember ever seeing the idea stated, yet it is probably in print. At any rate it deserves to be emphasized. Manure which is to be taken to the fields should be disposed of, wherever possible, with a view to its possibilities as a carrier of parasitic infestation. It will not always be possible to make the application. There are dairy farms where only cattle are kept, and the manure from these cattle must go back to the pastures and fields where the cattle will graze, unless exchange is made with neighboring farms running different kinds of stock. There are horse farms, hog farms, and sheep farms in a somewhat similar situation. In such cases one might bear in mind that well rotted manure would be safer than manure which had not been held long or rotted. The time element involved here permits of the death of eggs and larvae as a result of various unfavorable conditions, and the rotting process may well prove lethal, since in nature the worm eggs are washed onto the pasture and the larvae are capable of travelling, in some instances, yards away from the manure deposits. It is also likely that lime would kill larvae when added to manure.

However, there are farms where there is an option as to the

disposal of the manure of two or more kinds of stock. Horse manure may be put where horses are to run or where cattle are to run; where such alternative offers, it is advisable to put it where cattle are to run. The same principle applies to manure of ruminants, swine and horses. Where there is a considerable amount of poultry droppings, as there sometimes is, it may be regarded as safe for anything other than birds, and manure from other animals, generally speaking, will convey no parasites to birds. On the other hand, the feces of man and the dog are always to be regarded as dangerous. While it is true that there is little necessity for considering the disposal of quantities of dog feces, it is also true that the casual straying over our farms by dogs maintains a persistent supply of gid in sheep, hydatids in swine, other bladderworms in sheep and cattle, and other parasitic pests. While it is true that we do not make a practice of fertilizing our soil with human feces in this country as they do in China, it is nevertheless true that the informal practice exists in this country even if there is no statement of it as a formal agricultural measure. It is well known that in the southern states there has been, and still is over a large territory, an almost total neglect of sanitary provision for disposal of feces in the rural districts, and something of this neglect is true for some parts of the Northern rural districts. In human feces we not only have the source of numerous parasites of man, but the source of such parasites of our stock as "measles" (cysticercosis) in cattle and swine.

It may be urged that much of this barnyard manure is plowed under and the fields so treated sowed to crops which will be gathered and not fed back to stock. Quite true; and that it is a safe method of avoiding infestation. On the other hand, the plowing under of manure for forage crops cannot be regarded as assuring safety. There are possibilities for the survival of eggs and larvae and the likelihood that larvae would escape from the manure and soil under certain conditions.

What we are urging is no panacea, and it is not of universal applicability. We only urge that manure be regarded as the most important means of conveying parasitic infestation; that it be regarded as potentially dangerous; that in situations where there is an option in disposing of manure, it be placed where animals of the sort furnishing the manure will not be exposed to parasitic infestation from it. This same measure will also serve as an aid in the control of some bacterial diseases.

HORSE FLESH AS HUMAN FOOD*

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Historical Outline. The use of horseflesh as a human food is as early a custom as that of using the flesh of the other food producing animals. Archeologists have unearthed proof of its use by the caveman in northern Europe. That this custom was in progress long before the time of Moses, is evident by the prohibitive clause in the Mosaic Law against the consumption of horsemeat. Hippocrates refers to its use and Herodotus describes it as an early custom that prevailed from the extreme East to the Ural Mountains. Later, Xenophon, Pliny and Galen gave records of its use among the early Persians, Greeks and Romans. The Saxon tribes that occupied northern Europe sacrificed the horse as the most noble animal to their gods Odin and Freya, and accompanied the ceremonies of the sacrifices with great feasts in which the eating of horseflesh was customary. It was in their zeal to spread Christianity and to remove all signs of pagan worship and sacrifice, that Pope Gregory III. and his successor Zacharais I. sent to St. Boniface, the christian apostle in the Germanic countries, edicts prohibiting the use of horseflesh. These decrees were also issued to the people of Iceland, among whom hippophagy was so popular, that it was only in the year 1000, three centuries later, that the people openly discontinued this custom.

The nomadic tribes of Tartars, Kirghis and Kalmucks wandering about southeastern Russia and its Asiatic possessions have used horsemeat for a long time and were extremely fond of it. In Persia, asses were considered a delicacy, and throughout Asia the eating of horseflesh was customary. The Chinese had used horseflesh for ages and according to Ostertag had even developed a special breed of "fat" horse, that was characterized by its delicate bone structure, fattening powers and savory meat.

A few centuries ago during the period of exploration and discovery, the following information appears in regard to the use of horseflesh.

Phillips writes of the use of the flesh of horses, asses and mules by the Moors in Tunis, Algiers, and also of the presence of

*Presented at the meeting of the New York City Veterinary Medical Association, April 1917.

a species of a small horse that was raised solely for food purposes by negroes in Juida, Africa. In Marmol, Africa, wild horses were used for food by the natives. In South America, French and English explorers repeatedly mention the use of the flesh of wild and domestic horses for food purposes, as a custom in the various countries. Sir Francis B. Head stated that the Pampas ate the flesh of mares, which they never rode. Delvaille refers to the natives of Bolivia as preferring horsemeat, and others state that hippophagy was in vogue in Chili and among the Patagonians.

During the French Revolution the Parisians used horseflesh constantly for six months without bad results. To what extent and whether the custom of eating horsemeat was popular or prevalent among the people of the European countries prior to the beginning of the nineteenth century cannot be determined but it appears that later its sale and use was gradually permitted by the various governments as a necessary or progressive measure. Thus in 1807, in Denmark when the Danes were under siege, this measure was officially adopted. Larrey, the famous surgeon to the armies of Napoleon, used horsemeat to feed the sick and convalescent soldiers in the various campaigns and mentions its use in combating a scurvy epidemic. In 1840, Munich and in 1855, Germany permitted the sale and use of horseflesh. Vienna sanctioned its public sale in 1854. In France, Decroix, St. Hilaire and others had publicly agitated the use of horsemeat for many years and finally succeeded in influencing the government to authorize its sale and use on July 9, 1866. Horsemeat is now publicly sold in the other European countries with various degrees of popularity.

Use in Europe and United States. In 1889, a regulation was passed in Great Britain permitting the sale of horsemeat. No statistics of the extent of the use of horsemeat in Great Britain were available. There lately appeared the following in the London Meat Trade Journal: "Shops for the sale of horseflesh are being introduced into every large town. The high price of beef, mutton and pork is giving horseflesh an opportunity to acquire favor, and if the present cost of living continues after the war, horseflesh may become a permanent article of food." (Quoted from the Butcher's Advocate.)

In France, the use of horsemeat has been marked by an increasing public demand, as may be seen from the following statis-

tical data. These are incomplete and probably underestimated. Ostertag states that two-thirds of the horsemeat is manufactured into sausages and also that more than 100,000 of the 600,000 families in Paris use horsemeat. In 1910, twenty-nine million pounds of horsemeat was produced for consumption in Paris and its environs.

Number of Horses, Asses and Mules Slaughtered in Paris—1866-1910
(Gathered from various sources)

	Total	Horses	Asses	Mules
1866 (from July 9)	902			
1867	2125	2069	59	24
1868	2405	2297	97	11
1870–71	65000	64362	635	3
1872	5732	5034	675	23
1875	6865	6448	394	23
1878	11319	10800	438	31
1888	13475			
1898	21476			
1900	25059			
1902	31342			
1904	44279			
1906	58856			
1910	60338	57734	822	223

There are two horse abattoirs under municipal control which supply Paris. The retail establishments handling horsemeat rapidly increased in number from the date of authorization of its sale. In 1874, there were 48;in 1889, 132; in 1894, 212; and in 1906, 299. (Moreau$_9$.)

Number of horses slaughtered in Germany—(Ostertag) 10

In Prussia	1890–91	53,281 horses
	1893–94	58,306 horses
	1899	63,801 horses

According to 28th annual report of Bureau of Animal Industry*, Germany in 1909, slaughtered 152,214 horses which provided 79 million pounds of meat; approximately 1½ pounds per capita. (There were also 6990 dogs slaughtered for food purposes.)

Number of horses slaughtered in Municipal Abattoirs in certain cities (15)

12890 Horses slaughtered at Municipal Abattoir in Berlin
18290 Horses slaughtered at Municipal Abattoir in Vienna 1892
7132 Horses slaughtered at Municipal Abattoir in Milan, Italy 1907
1375 Horses slaughtered at Municipal Abattoir in Liege, Belgium 1906

Comparison of number of animals slaughtered and average per capita consumption of meat in Belgium 1905-1909 (2)

Horses slaughtered	38200	Horsemeat consumed per capita	1.51 kgm.
Cattle slaughtered	438900	Beef consumed per capita	17.54 kgm.
Calves slaughtered	350500	Veal consumed per capita	3.03 kgm.
Lambs and Sheep slaughtered	352400	Lamb & Mutton consumed per capita	0.74 kgm.

*(Statistique Agricole Annuelle—Dept. of Seine 28, B.A.I Annual Report).

At the Municipal Abattoir in Odessa, Russia, out of a yearly slaughter of 150,000 food animals, about 300 horses are slaughtered during the winter months for use by the Tartars. (15)

Probably the first mention of the use of horseflesh in the United States was made in 1898, when in the appropriation of that year for the Bureau of Animal Industry, provision was made: "That live horses and the carcasses and the products thereof be entitled to the same inspection as other animals, carcasses and products thereof."

Most of the horsemeat produced was prepared for export trade, as may be seen from figures below, though probably some of it was also for domestic consumption. In fact it seems that this regulation was enacted solely for the purpose of encouraging exportation, as the following letter appears by Vice Consul Blom, in the Consular Report of April, 1900: "Several years ago I called the attention of Danish dealers in horsemeat to the American supply. I have now to report that the business is increasing rapidly and the meat from the United States gives satisfaction. The consumption of horsemeat in Denmark is comparatively large and Copenhagen is a distributing port for Sweden, Norway, Finland, Russia and the German Baltic."

Horses exported from United States, 1900–1903 (1)

Year	No. Packages inspected horsemeat	No. certificates issued	Packages Exported	Weight
1900	602	8	472	188,800 lbs.
1901	821	9	880	249,900 lbs.
1902	638	11	638	170,986 lbs.
1903	70	1 shipment	70	28,000 lbs.

Description. The dressed carcass of the horse is characterized by its dark color, the absence of any extensive fat deposits, and the peculiar yellow coloring of the fat. It may be readily recognized by the length of the neck, number of ribs, the non-lobulated kidney and the many distinguishing bony structures, etc., though there may be considerable variations in the different breeds and types. There is lack of subcutaneous fat that makes the removal of the hide extremely difficult, and the fat deposits in the region of the kidney and the flank are relatively meagre, even in well nourished animals. In such animals the tendency is for the fat to be of a lighter shade and there usually is a rather thick layer on the median line and lower abdominal wall; there is also a peculiar fat deposit of firm consistency on the neck

(sometimes called "comb-fat") which differs from the usual yellow soft horse fat. The mesenteric fat has a darker yellow color and is scantily deposited.

Horsemeat has a deep dark red color, bordering almost to a brown or black and a bluish sheen appears on exposure to air. On section, the fascia is very prominent, and the absence of intermuscular fat and the lack of the marbling quality is very noticeable. Leach describes horseflesh as having a coarser texture, and short muscle fibres as a rule; Edelman describes the fibres as very fine; Huidekoper refers to the flesh of asses and mules as having a finer grain than that of the horse.

The bone-marrow is soft, greasy and waxlike, of a yellow color and stiffens when exposed to air. The offal of the horse, ass or mule, like the offal from the other food producing animals, may be grouped into edible, inedible and therapeutic by-products.

Composition of Horsemeat (Wiley) (13)

Water	69.81
Water in fat-free substance	76.91
Fat	9.61
Protein	19.47
Protein insoluble in water	14.83
Gelatinous protein	1.23
Meat bases	1.70
Glycogen	1.82
Ash	1.01

Water Protein and Fats in Common Meats—(Rubner) 12*

	Water	Protein	Fat		Water	Protein	Fat
Lean Beef	76.3	20.5	1.8	Fat Beef	71.0	19.9	7.7
Lean Veal	78.8	19.8	0.8	Fat Veal	72.3	18.9	7.4
Lean Pork	72.6	19.9	6.8	Fat Pork	47.4	14.5	37.3
Lean Poultry	76.2	19.7	1.4	Fat Poultry	70.0	8.5	9.3
Very Lean Mutton	76.0	18.1	5.8	Very Fat Mutton	47.9	19.8	36.3
Horsemeat	72.3	21.7	2.5	Horsemeat	72.3	21.7	2.5

In 100 parts of meat free from fat the following amount of dry substance was found: (Rubner$_{12}$)

Beef	21–22
Veal	20–21
Pork	21–23
Mutton	21
Horse	23–25

In the chemical analysis of the muscles of the various animals there are minor differences that bring out the distinguishing

*NOTE.—In the edition of Rubner (Lehrbuch der Hygiene) consulted, evidently composition for fat beef was given for lean beef as numbers given above were in transposed order.

properties of the various meats. While horseflesh does not materially differ to any great extent from the flesh of other animals, some of its individual characteristics are: the relatively large proportion of glycogen; the presence of certain extractives, and the peculiar qualities of horsefat.

Glycogen, or animal starch, is normally found in the muscles and in the liver, where it is stored up for future distribution in the body. Its physiological function is to aid in the metabolic production of muscular energy and animal fat, and its presence is not marked by a constant quantity in all the muscles of the body. An herbivorous diet that is rich in carbohydrates may be a probable factor in an increased glycogen content in the muscles of horses. Glycogen is present in greater quantities in well nourished horses, while it may be slight or totally lacking in overworked and underfed animals. Lobster and liver are other foods containing a relatively high percentage of glycogen, and are high in public favor.

Leach states that taurin is present in the flesh of the horse. Taurin is an organic compound that originates from proteids and belongs to that class of nitrogenous waste products or extractives in which, creatine, creatinine, xanthine, hypo-xanthine, etc., belong. These latter named compounds are commonly found in variable proportions in the muscles of all animals.

A special characteristic of horsefat is its high content of olein. Horsefat has also a very low melting point, a characteristic crystallization form, a higher heat value and a greater iodine number, etc.

Meat Inspection. Horses are usually slaughtered in abattoirs operated exclusively for this purpose. To conduct a careful and thorough ante-mortem examination, a well constructed stable, with sufficient space and stableroom is necessary. The importance of the ante-mortem examination may be emphasized for the following reasons: the majority of the horses that would be presented at the abattoir would naturally not be in a perfectly sound condition, and it is of great importance to recognize the condition that sends each animal to the slaughter house, and to ascertain if this condition affects its acceptability. The ante-mortem examination would also eliminate certain conditions of diseases that may not be marked by visible pathological lesions and yet render the flesh dangerous or unwholesome. Finally it would serve as an effective control of glanders, the early discovery of which

is so important that every possible precaution to eliminate its presence in a food product, is justified. A diagnostic mallein inoculation test supplemented by a suitable laboratory serological test should be the routine procedure.

The necessity for a suitable stable under the complete control of the public health authorities is further emphasized in order to insure a proper and effective quarantine and prevent any temptation on the part of those interested to foil, or interfere with, the natural course and outcome of the test.

Results of Ante Mortem Inspection on Horses (B.A.I. 1899-1903) (1)

Year	Horses Inspected	Rejected—subjected to post mortem exam. at abattoir	Post mortem inspection	Carcasses condemned at abattoir	Died at abattoir
1899	3,232	27	3,232	181	43
1900	5,560	66	5,559	112	29
1901	1,991	3	1,992	103	27
1902	1,649	0	1,649	25	48
1903	3,344	0	344	11	0

The post mortem examination of the horse should be carried out in a similar manner to that practiced in the examination of cattle. A more detailed and careful inspection is carried on in examination of the head which is split open so as to expose the mucous membranes of the nasal cavity, the turbinated bones and the sinuses. A careful inspection is made of the mucous membranes of the larynx, pharynx and trachea. Examination should also be made of the kidney, serous membranes lining the body cavities, the articulations, withers, skin, etc.

The pathological conditions met with in the slaughtering of horses may be conveniently grouped as follows:

1. Conditions that are not likely to be dangerous to man, and not affecting the wholesomeness of the food; this group would include those which were rendered useless for domestic service as a result of an acute or chronic injury acquired through accident, overwork or misuse; also certain conditions, affecting sight, hearing, or ability to partake of food, thus handicapping or limiting the usefulness of the animal. Also conditions about the limbs, involving the bony structure, tendons and articulations. Perhaps, also certain vices lowering the working capacity of the horse. Parasites of the horse may also be included in this group. According to Ostertag parasites found in the body of food animals may be grouped as follows: "Parasites, which are not transmis-

sible to man; parasites, which may be transmitted to man by eating meat; parasites which are not immediately harmful, but which may become so after a preliminary change of host.'' Under the last mentioned group, *Echinococcus polymorphus* may be considered, and as "they are more frequent in cattle than horses, they require no special reference". The parasites that may be transmissible to man by eating meat, are not commonly known to occur in the flesh of the horse. Parasites found in the body of the horse under ordinary circumstances are not of special importance in considering meat inspection.

2. Conditions and diseases of horses which may affect the wholesomeness of the flesh or prove dangerous to man. These embrace extreme age, emaciation, suppurative conditions, diseases of unknown etiology, toxemias, etc.

3. This group includes dangerous infectious diseases of the Equidae that may prove dangerous to man. For example such as glanders, tetanus, less frequently rabies, tuberculosis, etc.

Conditions causing Condemnation of Horses on Post Mortem Examination (B. A. I. 1900–1903) (1)

	1900	1901	1902	1903
Tuberculosis	1	—	—	—
Abscesses	1	6	1	—
Pneumonia	6	3	—	1
Pleurisy	1	1	—	4
Carditis	1	—	—	—
Enteritis	1	3	1	—
Peritonitis	3	1	1	—
Metritis	1	3	—	1
Septicemia	12	17	12	2
Pyemia	5	4	1	1
Anemia–Emaciation or Marasmus	37	11	3	—
High Temperature	2	—	1	—
Recent Parturition	2	—	—	—
Downers	29	4	—	—
Dead	29	27	48	—
Melanosis	1	2	4	—
Paraphymosis	1	0	—	—
Fistula	6	1	—	—
Open Joint	2	—	—	—
Gangrene	—	1	—	—
Pregnancy	—	40	—	—
Lymphangitis	—	2	—	—
Pharyngitis	—	1	—	—
Nasal discharge	—	2	—	—
Distemper	—	2	—	—
Jaundice	—	—	1	—

Opposition to horseflesh as a food. The earliest and most effective opposition to the use of horseflesh is that in the Mosaic

Law. The papal decrees of the seventh and eighth centuries stopping the custom of sacrificing horses and horseflesh that existed among the Germanic tribes and the people of Iceland have already been referred to. Probably to these religious restrictions is due the prejudice that grew against horseflesh, and exists even to the present day.

Considerable opposition is also due to the sentimental feeling for an animal as domesticated as the horse. Any such sentimental feeling must be regarded as inconsistent in view of the fact that other completely domesticated animals are slaughtered for food purposes. Indeed it would be an act of mercy well earned by many a faithful horse, that has lost his early vigor to be sent to the abattoir, rather than to allow him to fall into the hands of some huckster or cruel driver to be underfed and overworked to a gradual death.

Horsemeat is conceded to be a wholesome and nutritious food by eminent authorities in this country and abroad.

The use of horseflesh for human food should also be considered from the standpoint of public welfare, and as an improving economic measure. It offers an economical acceptable flesh food especially for the workers who are unable to afford the luxury of the present high priced meats, and still find it desirable or necessary to have meat a part of their daily diet.

It seems indeed unreasonable that so much valuable food should be wasted, in the face of the privations that exist among the poorer population in the larger cities. Here the foreign element have in the majority of cases been initiated to the eating of horseflesh in their native land, and would gladly accept this product in view of its proportionately lower price.

The opposition to horsemeat on the grounds of its physical characteristic is unjustified. The taste of manufactured products or culinary preparations may be so disguised as to make recognition difficult or impossible. Certain preparations of horsemeat are relished and preferred by those who have not allowed prejudice to get the better of personal taste. A slight sweetness of taste is considered one of the qualities of horsemeat, while toughness is not necessarily characteristic of horsemeat any more than it is of any other meat, but depends rather upon the age, sex and condition of the particular animal which it has been derived from.

Ostertag refers to Pflüger as mentioning that when horsemeat

is used exclusively it is apt to cause diarrhea, which is directly due to a substance present in horseflesh that is soluble in alcohol and passes over into the meat broth when horsemeat is cooked. This material consists of 75% lecithin and 25% of neutral fat and cholesterin. This injurious effect is in some manner avoided when the meat broth is poured off or when horsemeat is prepared together with beef or mutton tallow. Huidekoper states that horsemeat should always be broiled or roasted.

The following are the conclusions that were reached by the Italian Army Veterinarians Costa and Mori in regard to the use of refrigerated horsemeat: "Flesh of horses in normal physiological condition slaughtered under suitable rest, whether skinned, or quartered and left in the skin, will keep perfectly well for two months, if subjected to a temperature between 1 and 4 degrees Centigrade and an air moisture of 60 to 70 degrees." Meat cut in small pieces will not keep more than 25 to 30 days. Flesh from animals in normal but tired condition will not keep longer than 20 to 30 days, showing signs of decomposition in 15 days. The flesh in the skin, if withdrawn from the refrigerator every five days and left for 24 hours in ordinary temperature, keeps in good condition for 20 to 30 days, if carcasses were skinned and quartered, preservation would be but 15 to 20 days. The liver does not keep more than 8 to 10 days when it turns pitch black, becomes unsightly and a few hours after removal from the cold cells decays, showing that this organ is the least resistant to chemical or bacterial change. The kidney keeps 20 days. Brain if not removed from the skull keeps two months, if removed but one week at the longest. Loss in weight was from 8% to 10% in 30 days.

Refrigerated horseflesh after 15 days turns dark to black. The consistency remains normal for a long time. Chilled horseflesh becomes tender in 10 to 45 days, the outer surface appears brighter than fresh horsemeat. After ten days storage in the cold room the meat cooks more rapidly than fresh meat and required the same time as is necessary to cook unchilled beef of a 2 to 5 year old animal. The meat of tired animals was found not to cause any bad effects but gave evidence of lack of taste."

Opposition to the use of the horse for food purposes as an individual cannot be upheld with any degree of consistency. Its particular habits of cleanliness together with the careful domestic

attention that it receives, places the horse in this respect on a higher plane than the other domestic animals. In the selection of food, the fastidiousness of the horse has often been exaggerated, nevertheless, it is conceded that the horse is more discriminating in the selection of food than the other domesticated animals. In comparison with poultry or swine, discussion is unnecessary.

The method of procedure of the ante-mortem examination described previously should allay the fears of the public in regard to the possibility of unfit, worn out, or emaciated animals being slaughtered. This careful examination followed by a careful post mortem examintion should give further assurance that every possible measure is taken to produce a wholesome product. Indeed comparison with the method of procedure and the findings in slaughtering aged, worn out and emaciated dairy cattle, would perhaps place horseflesh in a better light.

Tuberculosis exists in dairy cows in very great proportions and a considerable number are passed for food purposes in spite of having some tubercular lesions. After slaughter the poor condition of many dairy cows does not allow them to be presented to the public by way of the butcher shop in the usual cuts. Nevertheless, the consumer approves this product in the form of bolognas, canned meats, sausages, etc., with an ever increasing demand, after the original meat has been made acceptable by the addition of condiments and flavorings of various kinds. Tuberculosis among horses in this country may be considered a negative factor in comparison to its frequent occurrence in cattle and swine.

While there are no parasites present in horseflesh that are known to be transmissible to the human species, man may become affected with tapeworm by eating beef or pork containing the larval forms of the parasite; and trichinosis may be produced by the eating of pork.

Restrictions and control. Because horsemeat and its products will be placed upon the market as an inferior product and cheaper in price, adulterations and substitutions in various manners may be attempted by the unscrupulous. The public would be entitled to protection for such reasons as well as in consideration for those who have a natural antipathy for horsemeat. Such protection may be promoted by regulations governing the slaughter and sale of horsemeat, rigid routine inspection and laboratory tests of material suspicious of adulterations or substitutions.

Regulations governing the slaughter of horses usually restrict the process to abattoirs specially designated for this purpose. The carcasses are stamped conspicuously or marked in some way in order to identify the nature of the meat. Selling horsemeat and its products are also limited to establishments that handle this product only, known signs, and the wrapping paper may also bear the information as to the nature of the article. Similar methods are used to control restaurants and factories handling horsemeat.

Rigid inspection should be exercised to detect unauthorized sale as well as any suspicion of adulteration or substitution, and legal prosecution should follow in all such cases.

Tests. There are numerous laboratory tests that permit the detection of horsemeat, even when prepared in form of sausages or other products. There are many different qualitative and quantitative tests for glycogen, which is present in larger quantities in horseflesh than it is in the flesh of the other food producing animals. A glycogen test is more difficult to carry on in the presence of starch. Further possibilities of inaccuracy are likely when the sample is not fresh, as the glycogen in the flesh changes over very rapidly after slaughter to a reducing sugar which interferes with the procedure of the test.

Glycogen content in horseflesh and beef, according to age—(Ostertag)10

Species	Age of meat	% of Glycogen
Horse	3 hours	.700
Horse	3 hours	1.026
Horse	1 day	.373
Horse	2 days	.603
Horse	5 days	1.072
Beef	4 hours	.204
Beef	½ hour	trace
Beef	2 days	.000
Beef	5 days	.076

Relative amounts of Glycogen—(Leach)8

	Water	Glycogen Direct Niebel Method	Glycogen Direct Maryhofer Method	Glycogen in dry substance Niebel	Glycogen in dry substance Maryhofer
Horseflesh	74.44	0.440	0.445	1.721	1.741
Horseflesh	74.87	0.600	0.520	2.388	2.069
Horseflesh	76.17	1.827	1.727	7.667	7.247
Veal	74.16		0.086		0.342
Pork	75.00		0.186		0.744

Wiley states that a safer test for detection of horseflesh than by proving the presence of glycogen, is in the examination of

horsefat. The fat is not so susceptible to change and may be effectively detected even when in finely comminuted state or in mixture with other meats. Horsefat has a lower melting point, a higher iodine number and a higher heat value when mixed with sulphuric acid.

Ostertag refers to Nussberger as finding it possible to determine horsefat by means of a Zeiss refractometer, which found horsefat to have a higher refractive index than that of beef fat.

Fat	Iodine Value	Butyro—Refractometer Readings Temp. 40°
Horse	71.86	53.7
Beef	38.46	49.0
Pork	50.70	48.6 to 51.2

Horsemeat may also be detected by means of a blood serum usually prepared from a rabbit, that has been sensitized by inoculations with blood serum of the horse or with juice from horsemeat. On contact of this prepared rabbit serum with the juice of horsemeat a reaction takes place.

Summary. Horsemeat has been used as a food since ancient times, to the present day, in different parts of the world.

The opposition to the use of horseflesh is mainly as inherited prejudice, arising from early religious restrictions. The opposition on the ground of its peculiar properties is justified. Horsemeat may be considered a wholesome, nutritious and economical food.

Horsemeat should be sold under special regulations, to prevent adulteration and substitution.

Every possible precaution should be exercised to eliminate glanders in horses offered for food.

According to certain writers horsemeat should be prepared in a certain manner.

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CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops from in the journals and 'when dead it is decently buried in books'."

ANTITETANIC SERUM IN ARTICULAR RHEUMATISM

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At times the Veterinary Department of the Experiment Station is called upon to respond, by mail, to inquiries concerning the treatment of animals in the rural districts, especially where no qualified veterinarian is readily available, and the following case, which was one of that kind, may be of interest to readers of the *Journal*, as it was to the writer:

On February 16th, a stockowner wrote that he would like my opinion regarding a very valuable Jack which he had purchased in Kentucky the previous April. "As well as I can see," said the owner, "he has rheumatic spells. Sometimes it is in his shoulder joints; at other times in his stifle; sometimes he is very lame in one front and one hind leg at the same time; and I have done all I could for him."

The treatment which had been given was a purgative, followed by a course of sodium salicylate, with blistering of the affected joints.

This gave temporary relief, but the attacks recurred, with changes in the location of the affection.

As the breeding season was approaching, the owner was, naturally, anxious for the recovery of the Jack, and I suggested a change to potassium iodide, and the use of hot carbonate of soda baths to the enlarged joints.

On March 10th, the owner wrote that the treatment "has worked like a charm." However, on April 26th, he wrote that the animal had again commenced to go lame in the left hind leg; that his stifle was affected; and that he wished further advice; and now comes the part which, to me at least, was quite interesting. In the interim I had met an acquaintance, a man of over middle age, whose occupation required his being in the saddle a great deal of his time. In conversation, he incidentally remarked that he had recently received a severe cut on one of his feet, and was advised by his wife to see his physician and have him inject a protective dose of antitetanic serum, at the same time remarking that he had been quite a sufferer from rheumatism which made it painful for him to mount his horse, especially in the morning, but that since receiving the serum, he had had little or no difficulty in doing so. This immediately brought to my mind the case of the Jack, and I at once wrote to the owner, relating the experience of this man, and suggested that he obtain some serum, for veterinary use, follow the directions accompanying the package, and try it as an experiment on the Jack.

On May 5th, the party wrote that he had given one dose (hypodermically) on the 3rd, and that the Jack was 50 per cent better. He had given the second dose on the 13th, and was to give the 3rd injection on the 25th.

On June 15th, there came a letter to the effect that three doses of the serum had been given, and that he thought the animal was completely cured; "he doesn't limp any more; the fever and swelling have all gone long ago; I am working him right along; and he is in good shape."

I then wrote and asked the party to kindly give me the details, as I might want to use them; and on June 27th, he gave me the following information: "The Jack had been ailing for three months. I have given him three doses, in all, of the serum. I bought a package containing 1500 units and divided it into three doses, making 500 units per dose.

"I injected it as near the joint as possible. I gave him the first dose on May 3rd; the second on the 13th; and the third on the 25th.

"In four or five days after the first injection I began to see a little change for the better. About seven days after the second dose, you just could see that his leg was a little weak; but in ten

or twelve days after the last dose, you could not see anything at all; and now he is in good shape and working better than ever; so I can call him completely cured, for no man living could tell that he had ever been sick.

"I think this is a very valuable trial, and I more than thank you for suggesting the serum treatment, etc."

"One swallow does not make a summer," of course, but this case has interested me considerably, and especially the manner in which the treatment suggested itself. The serum may have been used before in rheumatic affections in veterinary practice without my having observed the records; but if not, it seems worthy of further trial when opportunity offers, as it evidently had a beneficial effect in the case under consideration; although it may be that some other antitoxic serum might have a similar effect.

A SERUM TEST INFLUENCED BY ASCARIS INFESTATION

R. R. Birch, Ithaca, N. Y.

In the routine of serum production it is our custom to use eight pigs that are litter mates for making the tests. Recently we failed to secure the desired number from the same litter, so a test was conducted by using four pigs from each of two litters purchased from different sources. All were white pigs, weighing about sixty pounds each.

Pigs 1, 3, 5, and 8 were from litter No. 1. They were given 2 c.c. each of virus, and in addition pigs 1, 3, and 5 were given 10, 15, and 20 c.c. respectively, of serum. The serum pigs survived the test without incident, while No. 8, the check receiving virus and no serum, was in a dying condition in eight days from the date of injection. As far as this litter was concerned the test was satisfactory.

Pigs 2, 4, 6, and 7 were from litter No. 2. They also were given 2 c.c. each of virus, and pigs 2, 4, and 6 were given serum doses of 10, 15, and 20 c.c. respectively. No. 7 was given no serum and remained as a check. Thus each pig in litter No. 1 was paired with one in litter No. 2 receiving like treatment, yet there was a marked contrast in the reactions to serum and virus doses, of the pigs representing the two litters.

Seven days after receiving the test doses (2 c.c. of virus and

10 c.c. of serum) pig 2 (litter No. 2) showed dullness and loss of appetite. Temp. 103.8°. On the following day these symptoms were intensified and there was chilling. Temp. 106.2°. Examination in a good light revealed jaundice in a marked degree. The pig grew steadily worse and died fourteen days after receiving the serum and virus. Autopsy revealed extensive lesions of hog cholera involving kidneys, spleen and lymph glands. In addition, the small intestine contained great masses of ascarides, and the gall duct was enormously distended, and inflamed. It contained fourteen large worms.

Pig 4, (litter No. 2) developed symptoms nine days after receiving 2 c.c. of virus and 15 c.c. of serum. It too, showed elevation of temperature and the typical train of symptoms that accompanies hog cholera. In addition there was jaundice so marked as to compel notice. Death occurred after eight days of sickness. The only lesions of hog cholera revealed on autopsy were two or three petechiae on each kidney. The small intestine and gall duct were similar in appearance to the same organs in pig No. 2. Six large worms were removed from the duct.

Pig 6, (litter No. 2) received 2 c.c. of virus and 20 c.c. of serum It showed no symptoms other than the usual transient elevation of temperature, and came through the test in excellent condition.

Pig 7, (also of litter No. 2) which received virus only, died eight days after the virus was administered. Autopsy showed extensive lesions of hog cholera, together with the same character and degree of ascaris infestation already described. The parts were preserved as a museum specimen so the parasites in the gall duct could not be counted.

Because the checks receiving virus only showed the pigs in both litters to be highly susceptible to hog cholera; because each pig in litter No. 1 was paired with another in litter No. 2 receiving like treatment; and because the infested pigs receiving the lighter doses of serum died, while pigs free from parasites but receiving the same doses of serum and virus showed no symptoms, it seems reasonable to suppose that the worms were responsible for the difference in results. In a subsequent test in which nine litter mates were used this same serum proved potent in doses graded down as low as 10 c.c. per pig.

It is interesting to consider what would happen in the field

should a herd severely infested with ascarides receive simultaneous treatment. We have frequently noticed that infested pigs, when exposed to hog cholera die much more quickly than normal ones, especially if the parasites have entered the gall duct. Often death takes place before lesions of hog cholera appear, so that in the field one may easily be misled into attributing death to parasitism when it is really due to the combined action of parasites and hog cholera virus, the latter being the chief offender It is very doubtful, though, if any ascaris infested pigs would die as a result of simultaneous treatment if full doses of serum were administered. Even in this litter where the degree of infestation was extreme, the pig receiving 20 c.c. of serum survived and did not even show symptoms. It is possible, though, that it was an exception to its litter mates in not harboring any of the parasites. All things considered, it is very probable that disastrous results would follow simultaneous treatment of pigs badly infested like those in litter No. 2, if light doses of serum, so often unconsciously given as a result of underestimated weights, were administered.

In previous tests we have sometimes used litters in which the checks, at least, showed a few ascarides in the small intestine, and no unusual results have been observed. In none of these tests, though, have we happened to use pigs harboring so many of the parasites in the gall ducts, although from time to time we have found virus pigs as badly infested as the ones described. It is by no means uncommon to find the gall ducts greatly distended and packed with the parasites. In the pigs we have observed, both in the laboratory and in the field jaundice has in almost every instance been due to the presence of ascarides in the gall duct. It is probable that at the time the pigs in litter No. 2 were injected, a close examination in good light would have revealed jaundice.

ACUTE INTERSTITIAL NEPHRITIS OF THE EQUINE

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A disease fatal to suckling colts came to our attention during the spring of this year. Owing to the nature of the disease and its reported appearance in many sections of the state of Michigan, it

is important that the cases observed and studied by us should be reported.

The first case observed was that of a colt foaled at the Michigan Agricultural College on the night of April the 30th. The dam of this colt was in excellent condition and had been doing light work up to and including the day preceding the birth of the colt. She was fed a ration consisting of sound clean oats, mixed clover and timothy hay. After foaling, the dam and foal had the run of a grass paddock with a little bran at first, later light daily feeding of oats. The foal was normal in size and development, in good flesh and was able to get up alone, but walked a little unsteady. Immediately after birth the umbilicus was disinfected with tincture of iodin and afterwards with an antiseptic dusting powder. The first passage of the bowels was normal, but afterwards fecal passages were obtained only through the use of castor oil or rectal injections. There was no urination and the catheter was passed on June 2nd. The urine was somewhat cloudy and thickened in consistency. After the use of the catheter the colt was able to urinate without assistance, but there was almost always straining to urinate when standing and an apparent polyuria. After the first two or three days the colt was unable to get up without assistance and remained standing but a short time when put on its feet. There was no elevation of temperature, appetite remained good, but the colt lost flesh rapidly. There were edematous swellings of the stifle joints. The colt eventually became so weak that it could not stand when placed on its feet and was killed on the night of the eighth.

Upon autopsy there was the distention of the hock and stifle joints with a clear straw colored fluid in which there were a few flakes of fibrin(?) There was an acute fibrinous epicarditis, and parenchymatous degeneration of the liver. The kidneys were enlarged and hyperemic and numerous greyish-yellow sharply circumscribed areas were visible in the cortex, varying from one to three millimeters in diameter (acute interstitial nephritis).

The second case was that of a colt from the same source as the preceding case.

The dam of this colt was not at work, but was in pasture without grain. She was somewhat thin but in thrifty condition. This colt was foaled on the night of May 7th. The umbilical cord was treated in the same manner as described in the preceding case. The colt was very large, well formed and in excellent condition.

In fact the farm superintendent remarked that it was the finest colt he had seen in several years. There was a normal passage of the meconium, but subsequent action of the bowels was obtained only by the use of castor oil or rectal injections.

The colt did not pass its urine so the catheter was passed on the evening of the 8th at which time a thick syrupy urine was drawn. After the passage of the catheter there was a polyuria without assistance.

On the third day the colt became very weak, was unable to rise upon its feet without assistance. There was a considerable elevation of temperature, and constant straining to urinate. The colt rapidly lost weight and was unable to stand the last two days. The colt succumbed on the night of May 12th.

Autopsy—Petechial and ecchymotic hemorrhages under epicardium and endocardium. Parenchymatous degeneration of heart and liver. Kidneys swollen, hyperemic and numerous greyish- yellow foci in corte varying from one to three millimeters in diameter (acute interstitial nephritis).

In view of the fact that the clinical symptoms and the autopsy did not reveal the etiology of the peculiar disease, guinea pigs were inoculated intraperitoneally with one cubic centimeter of the heart blood and one cubic centimeter of a salt solution emulsion of a portion of the kidney of the colt. The pigs were found dead ten hours after the injection. Autopsy revealed considerable hyperemia in all organs. Smears of the heart blood were made on agar slants. The only organism isolated possessed the following characteristics:

Morhpology — Bacterium, 5 x 1 microns, bipolar, young cultures show tendency to form chains. Gelatin—No liquefaction. Milk—Coagulated (slowly). Litmus milk—Reduced. Agar slant—twenty-four hours at 37°C. isolated greyish-while colonies, becoming confluent; condensation water turbid and tenacious. Gas—No gas in dextrose, lactose, saccharose, maltose, mannit or glycerin bouillon.

Acid—In dextrose, lactose, saccharose, maltose, mannit and glycerine bouillon. Potato—Slimy growth.

Pathogenesis—Subcutaneous and intraperitoneal inoculation cause death in guinea pigs in ten hours. Post-mortem revealed considerable hemorrhage in all organs. Bacterium isolated from the heart blood. Rabbits refractory to doses which kill guinea pigs.

Thermal death point—63°C. for ten minutes.

On the 15th of May a six months old bull calf was given an intravenous injection of the washing from one agar slant of this organism. On the same date a very old horse was given an intravenous injection of washings from five agar slants of the same organism. The temperatures of the horse following the injection are recorded as follows: four hours after injection 102.9°F., six hours after injection 103.°F. On the 16th, 104.8°F., pulse 96, respiration 56. The horse refused to eat or drink and stood with head drooping. There was polyuria accompanied by hematuria. A blood sample drawn from the jugular on this date was examined microscopically and bacteriologically for the presence of an organism, no organism was found. The horse died on the 18th at 4 a. m.

The autopsy revealed numerous ecchymotic hemorrhages in lungs. Bronchial and mediastinal lymph glands injected. Ecchymotic hemorrhages under epicardium and endocardium. Parenchymatous degeneration of myocardium. Liver showed marked venous congestion. Kidneys were swollen and hyperemic. There were numerous sharply circumscribed greyish-white areas, varying from one to three millimeters in diameter appearing in the cortex (acute interstitial nephritis). An examination of the spleen revealed numerous petechial hemorrhages. The mesenteric, hepatic and renal lymph glands were injected.

The organism injected was isolated from the heart blood and kidney in pure culture.

The calf began to react one hour after the material was injected. The temperature rose to 104°F., accompanied with rapid pulse, labored breathing, salivation, profuse diarrhea and polyuria. The calf gradually became weak and five hours after the injection was unable to stand alone. On the 16th, the calf seemed to show improvement over the previous day. The temperature was normal, but the labored breathing and salivation still persisted. On the 17th, 18th and 19th the temperature rose to 104°F. The calf grew thin and weak. The appetite was very poor. On the 21st there was a noticeable distention of the hock and metacarpal joints with synovial fluid. This condition persisted until June 14th on which date the calf was killed for further examination. The only pathological alterations observed were considerable infiltration of the ligaments of the hock joints and a slight erosion of the articu-

lar surface of these joints. The lower ends of the metacarpal bones were slightly enlarged, but the articular surfaces were not involved.

A bacteriological examination of the synovial fluid revealed only a large micrococcus. A bacteriological examination was made of the blood from the calf on several occasions. No bacteria were found.

There appears to be no literature published on the subject. Hence, in view of this fact we hesitate to discuss or classify this peculiar organism at present. Further study is being made of the organism in this laboratory.

A culture of the organism was sent to the Department of Pathology, Bureau of Animal Industry, Washington, D. C., for the purpose of identification. The report is as follows:

Morphologically. The organism is a coccus of about .7 to 1 micron in diameter occurring singly, in pairs, and sometimes in groups. It is an aerobic, facultative anaerobe, and takes Gram's stain.

There is a luxuriant growth on agar in 24 hours at incubator temperature. The rapidity of growth is somewhat less at room temperature.

Cultures. Bouillon. Clouds whole medium, clearing somewhat after several days, leaving a considerable amount of flocculent sediment. Forms pellicle.

Agar slant. Luxuriant milky white spreading growth. Individual colonies are round, slightly raised with smooth surface, weakly refractive, translucent, of homogeneous structure and having entire edge. In the original culture the growth appeared to be somewhat tenacious and adhered to the medium. This character did not obtain in the first or subsequent transfers.

Potato: No visible growth.

Milk: 1st 24 hours, No change; *2nd 24 hours,* Same; *3rd 24 hours,* Slightly thickened; *4th 24 hours,* Coagulated, clear whey.

Litmus Milk: 1st 24 hours, Slightly acid; *2nd 24 hours,* More acid; *3rd 24 hours,* Decidedly acid; *4th 24 hours,* Same.

Gelatin stab. Diffuse colonies along line of stab. In about a week, begins to liquefy and continues very slowly as crateriform liquefaction.

Serum slant. Luxuriant white spreading growth, no liquefaction.

Dunham. No indol produced.

Fermentation tube, dextrose bouillon. Clouds both neck and arm of tube. No gas.

Lactose bouillon, same, acid produced.

Saccharose bouillon, same, acid produced.

Pathogenesis: Guinea pigs, rabbits, white mice and white rats proved refractory to both subcutaneous and intraperitoneal injections of heavy suspensions of the organism. (One white rat died 6 days after inoculation of an intercurrent malady).

Regarding the identity of this organism, none of the available data consulted revealed an organism of similar morphologic, staining, cultural and pathogenic properties.

A TUMOR ON THE MEMBRANA NICTITANS

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Patient was a well bred Beagle bitch, about one year of age, and in good physical condition.

Symptoms. The animal showed some conjunctivitis, with a discharge of pus on the skin at the inner canthus. There was some photophobia and the animal occasionally rubbed the eye with the front paw. The membrana nictitans was protruded somewhat and on closer examination of the inner part of the membrane a pink red tumor, about the size of a pea, was noticeable. This tumor formation is an enlargement of Harder's gland, probably brought on by some traumatic irritation.

Treatment. The eye was washed with a solution of boric acid and the secretions and pus removed from the inner canthus. A few drops of a four per cent solution of cocaine were dropped into the eye, the lids closed and gentle massage applied in order to anaesthetize the conjunctiva as much as possible. After waiting a few minutes the membrana nictitans was grasped with a pair of fine forceps, pulled upward and outward, and clipped off with a pair of curved scissors. Cold boric acid packs were applied for about five minutes to check all hemorrhage and the patient discharged.

"THE SUSCEPTIBILITY OF THE PRAIRIE DOG TO RABIES"*

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The significance of this paper does not at once present itself even to those most familiar with the prairie dog as constant neighbors. In fact, it was not apparent to the writer until three of these animals were presented to the laboratory as substitutes for rabbits. The vicious temperament and apparent intractability led us to suspect that they would make good subjects for experimental rabies. They were therefore set aside for observation and treatment.

Having but three animals it was decided to keep one for control and attempt, if possible, to establish a certain degree of immunity in the others so that some check could be had upon the action of the virus to which the animals were to be ultimately exposed. It was also believed that the course of the disease could be observed more intelligently by proceeding in this manner.

The following gives the result of this experiment in detail:

Animal No. 1; *Weight*, 1350 grams; *Antirabic Vaccine*, Special P. D. & Co. Experimental product; *Exposed*, 21 days after last injection of vaccine. Intracranial injection of 0.2 c.c. fresh virus; *Paralysis*, 13th day; *Remarks*, Died 16th day of rabies. Animal extremely nervous and very vicious during treatment. Following inoculation irritability increased, would attack dogs and had to be kept in closed cage.

Animal No. 2; *Weight*, 1140 grams; *Antirabic Vaccine*, Special P. D. & Co. Experimental product; *Exposed*, 21 days after last injection of vaccine. Intracranial injection of 0.2 c.c. fresh virus; *Remarks*, Immune to date (5-18-17). Nearly three months after death of other animals.

Animal No. 3; *Weight*, 1075 grams; *Antirabic Vaccine*, (control); *Exposed*, 21 days after last injection of vaccine. Intracranial injection of 0.2 c.c. fresh virus; *Paralysis*, 10th day slight paralysis right leg. 11th day coming down; *Remarks*, Died 13th day following inoculation.

It will be seen from the foregoing table that a fairly typical rabies infection may be suspected. The subsequent inoculations from the brain of these animals gave corroborative results.

It was not intended that this report of rabies in the prairie dog should be considered as final. Neither was it intended to be particularly of a rabies immunity problem. There are too many

*Presented before the March meeting of the Michigan State Academy of Sciences at Ann Arbor, Mich.

technical considerations to be allowed for such a problem on so few animals, as unrecognized protein reactions, meningeal symptoms from other than rabic causes simulating rabies, and a total lack of extensive experiments on these animals with which the present series may be compared.

A thorough search of the literature fails to show any previous record of rabies infection among prairie dogs. Nor are we able to ascertain whether this branch of the marmot family has been studied with any special reference to health problems. It is well known that other species may be easily infected and marmots in Asia and the western slope of the Rockies have been studied with reference to the plague problem.

Prior to 1914 when Henry W. Henshaw, Chief of the Biological Survey of the U. S. Government, reported his studies of the marmot, the relationship and ranges of many of the species of this rodent were quite imperfectly known.

Economic reasons were the cause of various investigations. In 1900 the Bureau of Animal Industry furnished an extensive review of losses endured by cattle men of the Southwest on account of the destructive effect of the prairie dog upon their grazing lands by their extensive colonization. The review was followed by many important articles during the succeeding twelve years but no hint of the health problem was mentioned. This seems almost incredible in view of the well known temperamental morbidity of these animals with their "nasty" tempers. In spite of its social exclusiveness and apparent timidity, so well known, the animal shows a marked disposition toward viciousness.

The prairie dog or prairie marmot (Cynomys) of which the best known species is *Cynomys ludovicianus* is closely related to the squirrel, chipmunk, rat, Cavidae, porcupine, hare, gopher, chinchilla, wood-chuck, and other species of the rodents.

Of this order it shows anatomically marked resemblance to all the various species and physiologically identical characteristics.

They are essentially a "social" animal living in immense colonies ranging from a few acres to thousands of square miles in area, the population averaging from 35 to 64 per acre. They are not easily captured and when taken they remain long savage and intractable. They may be tamed, however. Efforts to tame the animals reported in this paper, failed during a period of several years and no laboratory experiments could be undertaken with them because of their consistent ugliness.

Their natural enemies are the coyote, badger, black-footed ferret and a few denizens of the arid regions, among which may be named especially the owl and the rattle snake, both of which feed upon the young and receive no mercy from their very harmless looking captors who bury them in their holes when possible.

The prevalence of rabies among coyotes has recently been the subject of serious legislation and health department control in the west and the facts in the foregoing paragraph indicate how easily rabies may be spread among prairie dogs by these or other enemies, and thence to animals which might come in contact with them offensively. When it is borne in mind that their instincts lead them to almost heroic attempts at self preservation when attacked or angered, this becomes doubly apparent.

It is hoped this paper will lead to further studies by others on the marmot family as related to rabies. Certain problems closely related to it will be the subject of later reports from this laboratory.

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INTESTINAL INTUSSUSCEPTION IN CATTLE*

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CASE No. VII. A six year old Jersey cow was operated upon the sixth day. This patient died from necrosis of the sutured area. Parts probably were too much devitalized and it appears that rather more intestine should have been resected in both directions. Actual part removed was about four feet long.

*Cases No. I–IV were published in the March issue (1915) of the American Vet. Review. Cases No. V–VI were reported in the December issue (1915) of this Journal of the A. V. M. A.

CASE NO. VIII. This patient was an eighteen months old Jersey heifer. Three feet of small intestines were removed and recovery was complete.

CASE NO. IX. A four year old black and white grade cow was operated upon five days after attack. Upon opening the abdominal cavity and manual exploration it was found that the portion of intestine affected was held fast by a ligament in the right inguinal region. This had to be separated by traction in order to deliver the intestine into the wound. This was found rather firm and containing masses of feces of clay-like consistency. After massaging the contents out of this loop in a posterior direction the coil was reposited in the abdominal cavity and the wound closed. The bowels opened up within twelve hours. Recovery was uneventful.

CASE NO. X. A three year old fattened bull was to be slaughtered when he showed signs of colic. This was put off for the next day. As he had not eaten since the attack, we were called and the diagnosis of intussusception was made. The bull was slaughtered under inspection. The portion of intestine affected measured four feet.

CASE NO. XI. A nine year old red dairy cow was operated upon and had six feet of the small intestines removed. She made a good recovery, filling the pail night and morning this day (4th month after operation).

CASE NO. XII. A black grade cow, twelve years old, in poor condition, had four feet of intestines removed. Death followed after three days.

CASE NO. XIII. This patient was a six year old cow. Upon opening the abdomen a large quantity of fecal liquid escaped through the wound. Manual exploration of the abdominal cavity brought to light a portion of intestine that was completely separated from continuity by a process of necrosis. How this necrosis occurred the writer is unable to account for. This case was of course hopeless and the cow was destroyed on the spot.

While CASES NOS. IX AND XIII do not come under the heading of intussusception, they have found a place here for differential diagnosis. They had in common with typical cases the following: 1. Sudden attack of colic. 2. Loss of appetite. 3. Apparent constipation. 4. No bloating. 5. No fever. 6. Mucilaginous and sanguinous exudate in rectum with absence of feces. (Fecal matter with exudate and blood may be present or absent in typical cases).

All the cases were operated upon in the standing position. Chloral hydrate ℥ i in a quart of water before the operation and repeated if necessary is given as an anodyne. Cocaine is now used around the area of incision after Dr. Frost's case in the February number (1917) of this *Journal*. The incision is made in the right flank nearly vertical, or rather inclining forward ventrally. No. II catgut was used for the intestines and peritoneum, silk for the skin and wounds.

ABSTRACTS FROM RECENT LITERATURE

Gastric and Intestinal Tympany and Simple Aerophagy. J. Bouwman. *Veterinary News.*—An army horse was suffering with abdominal distention. His history showed that: several times a day he had shown peculiar actions, he opened his mouth, moved the tongue, nodded his head, then bent it towards the breast but did not seize the manger with his teeth as a cribber does. After acting this way several times, he had distended abdomen but no colicky pains.

This was his last condition, tympanitis and no colic. He was ordered walking exercise. The distention increased and then colic made its appearance. Arecoline was given followed by creolin. Recovery.

The gastric and intestinal troubles were likely due to aerophagy, (wind sucking). Liautard.

Rupture of the Perforans Tendon. J. Bouwman. *Veterinary News.*—Record of two cases. In the first, the horse had been neurotomized on the near fore leg. The accident occurred suddenly. Some fourteen days before, the horse held the toe of the foot a little distance from the ground and two or three days before had showed lameness. His symptoms were: the sole did not touch the ground and made an angle of 45 degrees with it. The leg rested on the heels and the pastern was much thicker than that of the other leg. At post mortem, the perforans tendon was found ruptured below the navicular bone and a piece of the bone was torn and attached to it.

In the second case, the horse had been lame on the near fore foot and unable to work. For three months it had been noticed that during walking the sole was turned upwards and the heels were

much rested and pressing on the ground. At the postmortem, a total rupture of the tendon near the navicular bone was found. There was ossification on both ends of the ruptured tendon.

LIAUTARD.

OROKINASE AND SALIVARY DIGESTION STUDIES IN THE HORSE. C. C. Palmer, A. L. Anderson, W. E. Peterson, and A. W. Malcomson. *The American Journal of Physiology,* Vol. XLIII. No. 3, page 457.—Orokinase makes active the inert saliva emptied into the mouth from the salivary glands. It is produced by the buccal glands, and possibly by the lingual glands. Buccal, lingual, and salivary glands were extracted with 50% glycerine. Mixed saliva was collected from the mouth and also through an esophageal fistula. Extract of the buccal glands is shown to have activated saliva from a parotid fistula and extracts from the different salivary glands. Mixed horse saliva (1–10), 2 drops taken activated fistula saliva. Two drops of human saliva (1–50) is also shown to have the same activating power. Bacteria of the mouth do not contribute to starch digestion, neither do they possess any activating properties. It was demonstrated in seventeen horses that mixed saliva possesses amylolytic properties and that when a good sample could be obtained that the amylolytic action was about as powerful as that of human saliva. Saliva that was easy to obtain gave better results than samples more difficult to collect. Mixed secretions collected through esophageal fistulae were of uniform potency. Mixed samples from the mouth were not uniform. Mixed saliva compared with human saliva showed that the two were of about equal activity when acting on cooked starch. Horse saliva is more active upon raw corn or oat starch. A diet of raw corn or oats escaping from the esophageal fistula shows a heavy reduction when tested with Fehling's solution, whereas the grain itself or the horse saliva possesses no reducing properties. The amount of complete starch conversion taking place in the mouth was not as great as was anticipated. Dr. C. C. Palmer proposes the name orokinase for the enzyme which activates the saliva.

HAYDEN.

ETIOLOGY OF INFECTIOUS ANEMIA OF THE HORSE. Carré and Vallée. *Recueil de Médécine Vétérinaire,* Vol. 92, pp. 193-199, 1916. Long and painstaking researches carried out by several investigators made it possible, about a dozen years ago, to state precisely

the principal points in the history of infectious anemia of the horse. Following is a résumé of the principal results of our researches:

1. Pernicious anemia of the horse is an infectious disease, inoculable, and due to an ultra-microscopic, filterable virus.

2. The blood and urine of the affected are virulent.

3. The virus is destroyed by heating to 60°.

4. Infection usually takes place by way of the digestive tract; urine being the source. (Urine from the affected horses contaminating the feed, drinking water, etc.)

5. Horses that have recovered apparently, remain, in reality, infected and spread the contagion around them.

These fundamental facts have received wide confirmation; placing them beyond any serious criticism. This would not have been mentioned were it not for the fact that certain periodicals, without any criticism have published the works of K. R. Seyderhelm and R. Seyderhelm, which to us appear to be contrary to the facts and detrimental to the success of prophylactic measures under consideration.

We believe it advisable to discuss the facts reported by them because the *Recueil de Médécine Vétérinaire* for January 1916, presents their conclusions together with extensive comments by Ries.

According to Seyderhelm and Ries, pernicious anemia is not caused by an ultramicroscopic virus but by a poison, oestrine, contained in the flies of the horse (*Gastrophilus equi* and principally *Gastrophilus hemorroidalis*). This conclusion is based on the assertion that an aqueous extract of the larvae, when injected into horses, produces acute, fatal accidents or chronic affections, which are progressive, anemiating and febrile.

We have not been able in several attempts to observe this interesting property of flies, obtained from anemic or healthy horses; nor has the Japanese Commission been more fortunate.

We agree with Ries and Seyderhelm that there exists in the horse, anemias of verminous origin, i. e. due to gastrophilus, strongylus, etc. But we refuse to admit the verminous etiology of pernicious anemia of the horse. We regard as demonstrated by our works and by the numerous confirmations they have received, *that there exists in this species an infectious anemia of inoculable, microbial nature, due to a filterable virus.*

The following facts support the affirmation without reserve or room for doubt: 1. Most of the anemic horses received at our laboratory carried neither Oestrus nor verminous aneurisms. While infectious anemia is distributed over a limited geographical area. Oestrus and Strongyles are found in abundance in innumerable horses in a state of health and in regions where infectious anemia never existed or is observed no more.

2. The "poison" of Oestrus, discovered by the Seyderhelms withstands heating in the autoclave for 1½ to 3 hours. Our work has shown that the virus of infectious anemia is destroyed by heating to 60°. This was confirmed by Marek, Ostertag and others.

3. Infectious anemia is transmissible by simple inoculation of blood from affected animals without the mediation of Oestrus or of oestrine. In our work the same virus was successfully passed 5 times from horse to horse.

Following are the best established points in the etiology and diagnosis of this particularly insidious infection. 1. The malady is transmissible by way of the digestive tract. The blood and urine of affected animals are virulent. A permanent source of infection is furnished by watering troughs that have become contaminated by stable drainage. The virus of anemia resists dessication and putrefaction for a long time.

2. During the course of its chronic evolution, anemia presents the following: violent fever, hematogenous icterus, hemoglobinuria, red cells are agglutinated; the serum is strongly colored or dichroic. In the interval between crises, the malady can be detected only by an examination of the urine which always contains albumin, examination of the heart and also the conjunctivae which appear thickened,pale and infiltrated. On autopsy one notes enlarged spleen and liver, endocarditis and a vigorous hemopoietic reaction of the marrow of the long bones.

3. Subjects that are apparently cured remain infective for months and years. Whatever success is obtained by the various treatments is problematic—the real recovery is characterized by non-virulence of the blood.

4. The separation, the surveillance of the affected animals, the disinfection of the dejecta, and the protection of the drinking water are imperatively indicated. The destruction of affected animals and of their carcasses are indispensable prophylactic measures, especially in the field.

5. All attempts at vaccination or serotherapy have up to the present been unsuccessful. BERG.

MAMMITIS IN COWS. J. J. Cosgrove, M.R.C.V.S. and William Scott, F.R.C.V.S. *Veterinary News.*—A cow had had three calves and was now pregnant. She was due to calve in three weeks. Ailing, she had hurried respiration, pulse 85, temperature 106°F. There was marked crepitus in the left lung. The right posterior quarter of the udder was swollen, hot and painful to the touch. The gland secreted a thick yellow material. The treatment applied was a mustard poultice on the chest, steaming, saline water to drink, and fomentations on the udder. The cow seemed to be worse the next day. Mammitis was characterized and vaccine treatment prescribed. Six ampoules were prepared with the material carefully obtained from the udder. The ampoules contained streptococci, staphylococci, albus and aureus. With the local treatment to the udder, the ampoules were injected as soon as they were made. A second injection was again made four days later, a third five days after and a fourth also when the condition had so much improved that the cow was declared convalescent. The two last ampoules were given later a week apart. Some abscesses had formed but the swelling of the udder gradually subsided and the cow and her calf reported doing well. LIAUTARD.

AN INTERESTING CASE. A. Spruell, Sr., F. R. C. V. S. *Veterinary News.*—Subject—A four year old cob gelding bolted while being driven and ran into a heap of stones. Result: comminuted fracture of the pastern and coronet of one hind leg. The parts were reduced to absolute pulp without breaking of the skin. The region was bandaged and the horse put in slings, while considering if the horse was worth treating. The decision being in its favor, the temporary bandage was taken off and replaced by a plaster dressing after careful preparation of the region. No more attention was paid to him and nature was left to care for him. After twelve or thirteen weeks in the slings the horse began to use his foot. After a time he was able to walk, to resume his work with only a slight stiffness. He finally became perfectly sound and able to perform his work, which he did for many years after. LIAUTARD.

Aortic Aneurysms in Dogs with the Report of Six Cases. S. R. Haythorn, M.D., Pittsburgh, Pa., and A. H. Ryan, M.D., *Jour. of Med. Research*, Vol. XXXV, No. 3, Jan. 1917, p. 411.—Aortic aneurysms in dogs are interesting not only because they are rare and have been studied relatively little, but also because they furnish good material for the study of medial disease, especially with reference to the pathological processes leading up to aneurysmal dilatations.

Somewhat over a year ago one of us (A. H. R.) accidentally came across the first of the aneurysms in the aorta of a dog which was being used in connection with the work of the department of physiology of the University of Alabama Medical School at Mobile. Following this finding careful examination was made of every dog which died in the department, with the result that five more well-developed instances were found. A seventh case was mistaken for an aneurysm until it was opened; when it was seen that the dilatation of the lumen was very slight and that the apparent enlargement was due simply to a nodular growth in the adventitia.

From the above data we have reached several conclusions:

1. The dogs in certain localities of the United States are infected with an oviparous nematode, *Spirocera sanguinolenta*.

2. This worm is prone to attack the walls of the aorta and cause a type of medial disease which leads to the development of aneurysms.

3. Successful inoculation of dogs with this parasite would afford an excellent method of studying experimental aneurysms.

4. Unrecognized *Spirocerca* lesions of the healed type might give rise to very erroneous conclusions if they occurred accidentally in dogs used in the experimental production of aortic lesions.

Reichel.

An Interesting Case of Fibromata. Capt. J. F. Tutt, A.V.C. *Veterinary News*.—A seven year old black gelding had been malleined with negative results. On account of obscure lymphangitic manifestations. These were on the near fore leg. The whole region from the point of the elbow to the lower third of the shank was covered with eruptions, some of which had broken off and left ulcers. Those which had not, looked like small subcutaneous fibromata. The lymphatic vessels were cordy as those of farcy, some extending to the neck, others to the axilla. It was decided

to treat the broken lesions as in some cases of epizootic lymphangitis. Examination of the material obtained from freshly opened lesions excluded the diagnosis of epizootic lymphangitis as neither the Rivolta's cryptococci nor the Preisz-Nocard bacillus were found. The animal was treated for some time and it looked as if recovery would be obtained but the improvement was only temporary and the horse was destroyed showing at the post mortem that the liver was full of tumors similar to those of the skin. LIAUTARD.

UNUSUAL CASES. G. Jones Roberts, F.R.C.V.S. *Veterinary Record.*—These might as well be recorded as unfortunate cases—for certainly they were.

Case 1—Four year old Shire mare gave birth to twin foals. Both were dead, both had crooked legs. About a year after the mare had a difficult foaling due to hydrocephalus. Asked for advice as to rebreeding from the mare, pure coincidence was answered and the mare went again in foal. This time, she had a head presentation with no feet coming. Attempts to find the fore legs failed and the foal was extracted by force without ropes. There was not a vestige of fore legs. The hind legs appeared longer, and the foal was jumping about on his sternum. On post mortem, the scapula was found present on both sides and at its end was rounded off like a cricket ball.

Case 2—Farmer called and asked for ointment to remove warts from a Shire mare above the eye. Notwithstanding full instructions it was used carelessly and some of the ointment went into the eye. The organ was lost. At that time the mare was pregnant. When she delivered, the foal had only one eye on the same side as that of the dam. The mare, dam and granddam originally had all their eyes perfect. LIAUTARD.

RINDERPEST. PREPARATION OF ANTI-SERUM. A. W. Shilston. *Bulletin No. 64,* Agricultural Research Institute, Pusa, India.—Immune bodies are present in full amount in eight days after the injection of rinderpest blood and potassium citrate solution into susceptible animals. The first bleeding for serum in hyperimmune animals may be made in eight days. Three bleedings at the rate of 6 c.c. per pound body weight taken on the 8th, 12th and 16th days yielded a mixed serum equal, in case of hill bulls, and increased, in case of buffaloes, in potency when compared with the

mixed serum of two bleedings. The two bleedings were made in 15 and 17 days at the rate of 6 c.c. and 8 c.c. per pound body weight. The three bleedings system gave an increase of 2.81 c.c. of serum per lb. body weight. The increase is 41.4 per cent over the former output. With an average issue of 500,000 c.c. of serum per month the increase in quantity is made with a very large reduction in the cost of production. HAYDEN.

INDUCTION OF PREMATURE LABOR IN MARES AND COWS. W. Scott, F.R.C.V.S. *Veterinary Record.*—This is indicated in cases where the life of the offspring had to be sacrificed for that of the mother. The modus operandi used by the writer is that of puncture of the membranes with a trocar after manual dilation of the os. The result is that labor pains may follow very soon after the operation or be deferred for several days. The manipulations are the same for either mares or cows. Artificial labor is indicated when the dam is suffering from wasting disease, the gravid uterus acting as an aggravating factor in cases of chronic kidney disease, hydrops amnii uterine hernia, deformity of the maternal pelvis interfering with the passage of the offspring. Five cases are recorded by the author. One in an aged blood mare, seven months pregnant, operated and aborted 33 hours after, perfect recovery. Another, a Guernsey cow, eight months pregnant, having extensive uterine hernia. Operated she had labor pains after four days, was delivered of a calf that lived a few hours. Recovery followed. A third case was that of a Short horn cow with hydrops amnii. Punctured, she was delivered of a dead calf 44 hours after. Turned out to grass, the cow did well. The fourth case is that of a pedigree cow with extensive dropsy of the ammnion. She was very low in condition. Punctured, she died before delivery. The last case is an aged milch cow, with extensive hernia. Operated, she died, having heart disease of long standing and chronic pulmonary emphysema.

LIAUTARD.

HORSE-SICKNESS OF RHODESIA. *The Lancet,* No. 4882, March 24, 1917, Vol. CXCII, p. 462.—In the Rhodesia Agricultural Journal, Mr. L. E. W. Bevan, M.R.C.V.S., Government veterinary bacteriologist, refers to this disease which affects horses and mules, and caused a loss of 30,000 to the colony in the year 1911. It is due to an ultra-visible virus contained in the blood, exudates, and bron-

chial secretions of animals affected. It is communicable to dogs by inoculation and by feeding upon infected meat. Animals that recover from the disease acquire a certain degree of immunity, but this is not complete against reinfection. Theiler found that "the serum of an immune animal which has periodically been immunized acquires immunizing properties". The immunizing of mules against horse-sickness has been practiced in the colony since 1895. This is done by a simultaneous injection of serum and virus, and Southern Rhodesia has derived enormous advantage from it.

REICHEL.

MULTIVESICULAR HYDATID CYST OF THE LIVER. F. Dévé. *Revista de la Asociacion Médica Argentina,* v. 26 (148), Margo, 1917, p. 143 et seq.—This paper is of considerable interest to medical men and zoologists, sustaining, as it does, a somewhat unusual thesis in regard to the nature of the hydatid cyst and outlining certain medical principles on the basis of that thesis. Any statement in regard to hydatids coming from Dévé is worthy of consideration, as there is no better authority on this subject.

Dévé states that every multivesicular hydatid cyst is one which has suffered, and that endogenous budding is a defense reaction on the part of a parasite vitally menaced. The customary belief is that these daughter-bladders in the hydatid represent the typical, normal development, in fact, a terminal stage of complete development, though some writers have differentiated these forms from the ones with a single vesicle under a different specific name. Dévé regards the simple fertile cyst, with its content of brood capsules, as the typical, normal hydatid. He takes issue with the opinion that internal and external daughter-bladders both arise from islands of germinal membrane between the layers of the thick wall of the simple hydatid cyst, and recapitulates his earlier work showing that only the external daughter-bladders have a cuticular origin, the internal bladders having an endovesicular origin. These internal bladders are derived from the germinal membrane, either directly, a rare condition, or indirectly at the expense of the brood capsules by "cuticularization" of these elements, or of the scolices by vesicular metamorphosis of these elements, the last named being far the more common origin.

So long as the vitality of the simple hydatid cyst is not lessened by senescence or undiminished by external aggression, so

long as the intimate biological conditions of the cyst are undisturbed, just so long will the cyst retain its limpid content, its tension, its brood capsules attached to the germinal membrane, in a state of repose; in a word, it remains quiescent. It continues to enlarge and may contain 3 to 4 liters of fluid without a single daughter cyst. But if it is subjected to some injurious stimulus, sudden or gradual, the cyst functions in a defensive manner through the formation of cuticular elements to the production of daughter-bladders. The latter is then a form of resistance of the hydatid elements, destined to assure the survival of the parasite and, in a measure, the perpetuation of the species.

It is interesting to note that this defense reaction is particularly the function of the scolices, elements which are completely individualized, independent, resistant and active. Yet these elements, well protected as they individually are against untoward and adverse circumstances, differentiated into the initial element of the succeeding sexual stage, are all prepared to undergo the banal transformation into the asexual cyst when the life of the hydatid is threatened. So well prepared are they that less than 40 hours after the intervention of some disturbing stimulation, the scolices will have begun their cystic metamorphoses.

One of the causes leading to endogenous cyst formation is the natural senescence of the germinal membrane, the arrest of development of the simple hydatid cyst by the inextensibility of a thick fibrous pocket, at times more or less calcified, or the death of the hydatid cyst by spontaneous involution. Dévé takes the position that the injury and death of the mother vesicle are the causes of endogenous cyst formation, and not the results as is commonly stated; that internal cyst formation is not a normal condition which is carried to the point where it kills the distended mother cyst.

Other causes leading to internal cyst formation are vicissitudes, natural or artificially provoked, to which the hydatid is subjected, the chances and frequency of such unfavorable occurrences increasing with the age of the host. The unfavorable elements may be mechanical, such as the evacuation of the hydatid fluid, toxic, such as injections which are insufficiently parasiticidal or the action of bile in the perivesicular space, or infectious, such as perivesicular sepsis or septic cholerrhagia. Puncture, for evacuation or injection, acts directly on the internal germinal membrane;

the other causes act from the exterior on the mother cyst. The evacuation of the cyst may be spontaneous, or it may be by medical puncture, exploratory, evacuative or for parasiticidal injection. Whether evacuation is spontaneous or from medical puncture, it is frequently followed by internal cyst formation. This cyst transformation of the scolices probably arises from various causes following evacuation of the hydatid liquid, among other things the diminution of the hydatid tension and the biochemic modifications of the vesicular liquid may be etiological.

The unfavorable action of bile is noted above as a cause of internal cyst formation. The thick walls of the simple hydatid are often permeable to bile as far as the germinal membrane, nevertheless prolonged contact with bile will injure or ultimately kill the mother cyst. Suppuration, usually of hematogenous origin, may have the same effect. It is just possible that intercurrent diseases of the host, especially the febrile diseases, may have an adverse effect on hydatids but this is a point on which we have little data.

Dévé gives an admirable comparative table for the pathological anatomy, symptomatology, evolution and complications of the simple and the multivesicular hydatid. M. C. Hall.

—It is reported that Dr. David E. Buckingham, Dean of the Veterinary Department of the George Washington University, has been asked to assist in passing upon the 425,000 horses and mules needed for the army. Dr. Buckingham has had experience along this line during the Spanish-American War and also served the government on the Mexican Border last summer.

—The Oregon Veterinary Medical Association held a successful two-day meeting at Salem, June 15 and 16. It was decided to hold the next meeting at Portland in conjunction with the Washington Association. Dr. S. M. Reagan was elected president and Dr. B. T. Simms, secretary-treasurer.

—Dipping cows to kill fever ticks actually increases the yield of milk, according to the U. S. Department of Agriculture. Records prove that lightly infested cows produce 18.6% less milk than free cows, while heavily infested cows produce on an average 42.4% less milk than similar cows freed from ticks.

A circular letter announces that Philadelphia, Pa. has its "hat in the ring" for the next meeting of the A. V. M. A.

ASSOCIATION MEETINGS

AMERICAN VETERINARY MEDICAL ASSOCIATION

PROGRAM OF THE FIFTY-FOURTH ANNUAL MEETING KANSAS CITY, MO., AUGUST 20-24, 1917.

Headquarters, MUELBACH HOTEL, 12th & Baltimore

Place of Meeting, KANSAS CITY VETERINARY COLLEGE, 15th & Lydia

AUGUST 17TH AND 18TH

MEETING OF THE EXECUTIVE BOARD

AUGUST 20

9:30 A. M.—Opening Exercises in the College Auditorium.

12 M.—Luncheon at the College.

1:30 P. M.—First session of the Section on Sanitary Science and Police, of the Section on Surgery and Practice and of the Association of Faculties and Examining Boards.

8:00 P. M.—Meeting of Alumni Associations.

AUGUST 21ST

9:30 A. M.—Second session of the Section on Sanitary Science and Police and of the Section on Surgery and Practice.

12 M.—Luncheon at the college.

1:30 P. M.—General Business Session including the election of officers.

8:00 P. M.—Reception at the Muelbach Hotel.

AUGUST 22ND

9:30 A. M. to 5:30 P. M.—Pathological Exhibit and Luncheon at the Armour Packing Co.'s abattoirs.

AUGUST 23RD

9:30 A. M.—Third session of the Section on Sanitary Science and Police and of the Section on Surgery and Practice, and the election of the section officers.

12 M.—Luncheon at the college.

1:30 P. M.—Joint session.

7:30 P. M.—Annual Banquet at the Muelbach Hotel.

AUGUST 24TH

9:30 A. M.—General session for unfinished business and Clinic until 4 o'clock P. M.

LITERARY PROGRAM

MONDAY, AUGUST 20, 1:30 P. M.

SECTION ON SANITARY SCIENCE AND POLICE

(Auditorium)

1. Chairman's Address, J. G. Wills, Albany, N. Y.
2. Secretary's Report, T. E. Munce, Harrisburg, Pa.
3. Advantages of Testing Pure Bred Herds, S. H. Ward, St. Paul, Minn.
4. Tuberculin Testing and Retesting, C. J. Marshall, Philadelphia, and Henry W. Turner, Pittsburgh, Pa.

5. Some of the Problems in the Control of Tuberculosis in Animals, Jacob Traum, Berkeley, Cal.
6. Tuberculosis, Channels of Infection and Localization, Charles H. Higgins, Ottawa, Canada.
   Discussion by V. A. Moore, F. Torrance, J. A. Kiernan, O. E. Dyson, A. S. Cooley, Geo. H. Hart and J. I. Gibson.

SECTION ON SURGERY AND PRACTICE
(Room "B")

1. Chairman's Address, T. H. Ferguson, Lake Geneva, Wis.
2. Secretary's Report, J. H. Blattenberg, Lima, Ohio.
3. Coital Exanthema, Hal Simpson, Dennison, Iowa.
4. Sterility in Mares, F. F. Brown, Kansas City, Mo.
5. The Abderhalden Test for Pregnancy in Animals, C. A. Zell, Chicago, Ill.
6. Mastitis, W. A. Axby, Harrison, Ohio.

TUESDAY, AUGUST 21, 9:30 A. M.
SECTION ON SANITARY SCIENCE AND POLICE
(Room "B")

1. Vesicular Stomatitis, J. R. Mohler, Washington, D. C.
   Discussion by A. W. French, Chas. G. Lamb and A. S. Anderson.
2. Anthrax Control, R. C. Reed, Baltimore, Md.
   Discussion by W. H. Dalrymple, R. P. Marsteller, E. M. Ranck and W. L. Gates.
3. Studies of an Obscure Cattle Disease in Western Nevada, W. B. Mack, Reno, Nev. Discussion by A. T. Kinsley.
4. The Cleaning and Disinfection of Live Stock Cars, S. F. Musselman, Frankfort, Ky.
   Discussion by F. Torrance, L. E. Northrup and James Fleming.
5. Some Studies on the Tuberculin Test, M. H. Reynolds, St. Paul, Minn.

SECTION ON SURGERY AND PRACTICE
(Auditorium)

1. Osteopathy in Veterinary Practice, E. A. A. Grange, Toronto, Ont.
2. Heat Stroke, Its Complications and Treatment, Reuben Hilty, Toledo, Ohio.
3. Influenza, with Special Reference to Its Most Important Complications, G. W. Dunphy, East Lansing, Mich.
4. Intussusception in Horses and Colts, J. F. DeVine, Goshen, N. Y.
5. Some Original Methods, Instruments and Operations, Wm. M. Bell, Nashville, Tenn.
6. Digestive Disorders of Cattle, D. H. Udall, Ithaca, N. Y.

THURSDAY, AUGUST 23, 9:30 A. M.
SECTION ON SANITARY SCIENCE AND POLICE
(Room "B")

1. Some Observations on Hog Cholera and the Use of Serum, C. H. Stange, Chas. Murray and C. G. Cole, Ames, Iowa.
   Discussion by J. W. Connaway, R. A. Craig and E. A. Cahill.
2. The Regulation of the Production and Sale of Veterinary Biological Products by the Bureau of Animal Industry, J. R. Mohler, A. R. Ward and H. J. Shore, Washington, D. C.

Discussion by John Reichel, Frank Breed, T. F. Krey and Geo. H. Roberts.

3. Immunization Against Blackleg, Adolph Eichhorn, Pearl River, N. Y. Discussion by R. A. Archibald and Ward Giltner.
4. Some Studies on Forage Poisoning, R. Graham, Lexington, Ky.
5. (Section will adjourn to the Auditorium to participate in the discussion on Abortion Disease.)

SECTION ON SURGERY AND PRACTICE

(Auditorium)

1. Serum Treatment of Canine Distemper, A. Slawson, New York, N. Y.
2. Handling of Dogs in a Veterinary Practice, Arthur Trickett, Kansas City, Mo.
3. Three Stereopticon Lectures:—Diseases of the Feet, H. S. Murphey and H. E. Bemis, Ames, Iowa; Distribution of the Median Nerve and the Lameness in Horses Benefitted by Its Resection, Jos. Hughes, Chicago, Ill.; Surgical Treatment of Maxillary Actinomycosis, L. A. Wright, Columbus, Wis.
4. The Avenue of Invasion and the Behavior of Abortion Infection in the Uterine Cavity, W. L. Williams. Discussion by members of both sections.

THURSDAY, AUGUST 23, 1:30 P. M.

JOINT SESSION

(Auditorium)

1. Unfinished discussion on Abortion Disease.
2. Symposium on Animal Parasites:
   (a) Parasites of Swine, W. Lester Hollister, Avon, Ill.
   (b) Parasites of Sheep, A. D. Knowles, Missoula, Mont.
   (c) Parasites of Cattle, Seymour Hadwen, Agassiz, B. C.
   (d) Parasites of Horses, C. P. Fitch. Ithaca, N. Y.
   General discussion on Animal Parasites opened by B. F. Kaupp and L. Enos Day.

SECTION ON VETERINARY COLLEGES AND EXAMINING BOARDS

M. JACOB, Chairman ROBERT D. WALL, Secretary

Meeting, afternoon of August 20.

The following will constitute, in part, the program:

1. Report of the Detroit meeting, August 19, 1916.
2. Report of the Committee on Examination Questions.
3. Paper by Dr. S. Stewart.
4. Paper by Dr. M. Jacob.
5. Paper by Dr. H. E. Bemis.
6. Paper by Dr. E. L. Quitman.

There will be free discussion of the above papers and also other papers by members of the association.

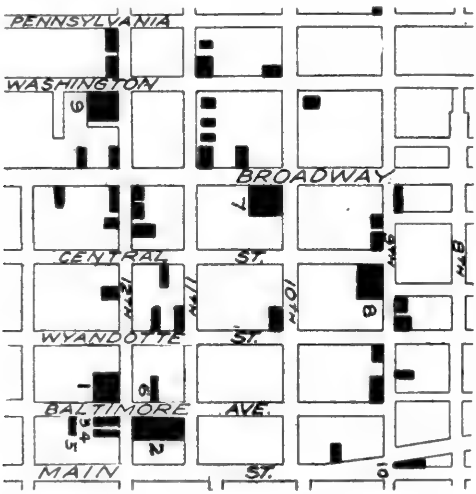
CLINIC PROGRAM

FRIDAY, AUGUST 24TH, 9:30 A. M. TO 4 P. M.

(Surgical Amphitheatre)

1. Securing Cows for Udder Operations, J. P. West, Madison ,Wis.
2. Surgical Treatment of Sterility, W. L. Williams, Ithaca, N. Y.

3. Operation for Roaring, J. W. Adams, Philadelphia, Pa.
4. Special Procedure for Sidebone, L. Hart, Chippewa Falls, Wis.
5. Hernia Operation, G. B. McKillip, Chicago, Ill.
6. Extraction of Molars Under "Nerve Blocking" Anaesthesia, H. E. Bemis, and L. A. Merillat.
7. Operation for Obstruction of the Teat, T. H. Ferguson, Lake Geneva, Wis.
8. Operation for Fistula of the Withers, H. E. Bemis, Ames, Iowa.
9. A New Operation for Recto-vaginal Fistula, R. C. Moore, St. Joseph, Mo.
10. A New Operation for Preserving the Function of the Parotid Gland in Fistula of Steno's Duct, L. A. Wright, Columbus, Wis.



Plan of Headquarters District

SECRETARY'S OFFICE

1827 South Wabash Avenue, Chicago, Ill.

A FEW THOUGHTS AND RECOMMENDATIONS

To improve the American Veterinary Medical Association is to improve our country and our profession as well as ourselves individually. This seems, at least, reasonable and if so it is more and more difficult to explain, as the needs of organization becomes more apparent, why so many good men are content to enjoy the fruits of our growing industry without giving a helping hand to the few loyal, public-spirited men upon whom falls the burden of doing the constructive, the protective and the educational work required to keep us a separate, recognized and useful entity among the world's vocations. It is painful, or rather shameful, to record at

this day of our history that fewer than ten per cent of the veterians of this country support the organization that created and now maintains a profession for them to exploit and enjoy. This is not a whine nor a whimper; it is but a cold fact for the younger generation of veterinarians to ponder over.

There is a brilliant future in this country for a well organized veterinary profession that will keep pace with the growing needs of our vast live stock interests, but there will be no place for a drifting, shiftless, half educated mob having no greater aim than self aggrandizement.

The average man is little enough inclined to even stop and inquire into the security of his position, but the down and out shirker is he who lends no support whatever to the agency through which security is maintained.

Obviously the veterinarian, like Americans in general, having found prosperity without effort, has never thought of drafting studied plans for self-preservation and is today the victim of his own indifference.

While these may seem like plainly harsh words, they are the relation of facts which confront us and which we might do worse than accept as facts to be used as a point of departure to higher heights. "It is a condition and not a theory that confronts us."

The sphere of influence covers so vast a territory that it has been impossible, without an official organ, to keep the membership posted on the association's aims and activities. The few who have found it convenient to attend the annual meetings have always been proud enough of its achievements and pleased enough with its educational features, but with nothing more than this annual inspiration to keep up enthusiasm and with this inspiration reaching only a small part of the total membership, progress in the veterinary profession in America has lagged. With a good journal as an official mouth-piece, manned with able men, ably and loyally supported by the members, the prospects for advancement are more bright during the next quarter of a century than during the past one. But those to whom the management of the association is entrusted assume a big responsibility. They have large fields to cultivate, fields containing all of the potentialities of a great and indispensable industry. It is for them to begin now to lay down the foundation for an edifice of which our successors will be proud. These men must be big enough to keep down the internal strife

that spells retrogression by being fair and just but firm in handling the questions that come before them. They must be men who by understanding the actual condition we have to meet will not thwart progress by insisting upon untimely and hasty reforms any more than by inaction.

The association besides having the full responsibility of protecting the welfare of the profession, as such, is also an incorporation engaged in a business, subject to the laws of trade and commerce. It may prosper or it may become bankrupt just like any other enterprise may do. The margin between prosperity and bankruptcy in any business is never great, with us it is something alarmingly narrow. Those who assume the responsibility of executive duty in the association have this also to ponder over. They must not enact and enforce regulations which will threaten the business feature of our enterprise. Unfortunately, we have a board of directors (Executive Board) who only meet at wide intervals and who are in no position between these intervals to participate in the management of the enterprise. They must therefore trust implicitly to the Editor and the Secretary to pilot the ship safely between the meeting dates, and while our President and the whole Budget Committee are supplied with current information about finance both from the Secretary and the Editor there is nothing in the laws of the association that compels them to do so. It is therefore evident that these officers should be wisely chosen, because bankruptcy would be our greatest disgrace.

Presidential Appointments

Dr. Frank E. Barnes, Waxahachie, Texas, Secretary for Texas, vice J. Allen Foster, dismissed.

Dr. A. McKercher, Lansing, Michigan, Secretary for Michigan.

Meeting of the Executive Board

The Executive Board will meet at the Muelbach Hotel, Kansas City, Friday, August 17th. The call is made at the unanimous request of the members and for the purpose of cleaning up the great volume of work it has to do previous to the opening of the meeting on the 20th instant. During past years the Executive Board (then Executive Committee) had taken but little time for deliberate action, their meetings having been held hastily between sessions, often at late hours and seldom under conditions favorable for deliberate constructive work.

Members especially interested in questions to be considered at this meeting are urged to present their arguments in person or in writing no later than August 17th. The Secretary's address between August 17th and August 25th will be No. 1336 East 15th Street, Kansas City, Mo.

The Secretary will have an office on the second floor of the college building, ably attended, for the payment of dues, the filing of applications and for taking of subscriptions to the *Journal* from non-members.

Bills for the dues of 1917 will be mailed about August 1st, together with a booklet containing a program of the meeting. Members are urged to pay their dues by mail before the date of the meeting, but will be accommodated at the meeting nevertheless. It must be remembered that there is now a constitutional provision that disfranchises members whose dues are not paid.

L. A. Merillat, Secretary.

COLORADO VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Colorado Veterinary Medical Association which was held at the Agricultural College in Fort Collins on May 31 and June 1 was one of the most successful and largely attended ever held by this body.

The first day was given over to a business session and the reading of papers. The second day was taken up with clinic. Entertainment consisted of a banquet at the Northern Hotel on the evening of May 31, and a picnic lunch at noon on June 1.

The most important business consisted in extending an invitation to the A. V. M. A. to meet in Estes Park in 1918.

The out of state guests were Drs. H. Jensen of Kansas City, H. R. Millard and Y. R. Balmer of Cheyenne.

After the address of the President, R. H. Bird, the subject of the newer treatments for blackleg was taken up in papers by Drs. Owen Howells and O. B. Morgan. These were discussed at length by Dr. Jensen and a considerable majority of the members. It seemed to be the concensus of opinion that the liquid vaccine, germ free filtrate and blackleg serum were a considerable step in advance of the old spore vaccine.

Dr. H. E. Kingman gave his experience in the use of Dakin's solution, reporting on a considerable number of cases which had been under his charge in which treatment consisted of daily irrigations of Dakin's new antiseptic.

Dr. H. S. Eakins reported on some pharmaceutical specialties which he believed would be of value to the profession, illustrating his talk by showing samples of the preparation which he discussed.

The Rabies outbreak at Fort Lupton, Colorado, was covered in a paper by Dr. H. V. McCullah. This was especially interesting as it dealt largely with rabies among cattle. The records had been accurately kept and there was much information on the incubation period and symptoms of this disease in the bovine species.

Under the title of "A Glimpse at Opportunities" Dr. Charles G. Lamb discussed the great value that a knowledge of breeding and feeding would be to the veterinarian, illustrating his talk by detailing some examples from his experience.

"Cotton Seed Poisoning in Pigs and Calves" was discussed by Dr. A. G. Wadleigh.

The ever recurring problem of contagious abortion was reopened by Dr. I. E. Newsom who gave as his excuse for bringing it up that the Experiment Station proposed to do some work on the subject in which the local practitioners could be of assistance.

The large and varied clinic took up the time of the second day. One of the most interesting cases was that in a dairy cow which had been diagnosed as traumatic pericarditis. She was presented on the day of the meeting with a slight swelling on the brisket. After examination she was destroyed and it was found that the left lung occupied fully two-thirds of the thoracic cavity and was filled with gallons of pus. In the abscess was a nail which was evidently the cause of the trouble. The heart, while very flabby and much compressed, showed no suppurative lesions. This reminded us of a case at the same clinic two years previously in which the foreign body had penetrated the spleen instead of the pericardium as is so often the case.

Dr. A. A. Hermann, of Littleton, presented some new instruments, among which was a probang attached to a battery in such a way that the end constituted a powerful magnet. It was his idea that this might be used to withdraw nails and pieces of wire from the reticulum of cattle.

Some other cases were poll evil, suppurative metritis in the mare, and a peculiar nodular condition of the teats of cows and a mechanical injury to the loins resulting in an abscess that had penetrated the peritoneal cavity. I. E. Newsom, Secy.

WESTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

On June 15th, 1917, The Western Michigan Veterinary Medical Association, combining the veterinarians of Ottawa, Muskegon, Kent and Allegan Counties, met at Streator's Resort, Miner Lake, Allegan, for their June session.

A fish dinner and basket-lunch were served and enjoyed by all present and an address of welcome was given by Mayor Secrist of Allegan, followed by an address by Mr. Harper, of the State Livestock Sanitary Association, and one by Dr. Hayes, of the B. A. I.

A paper by Dr. D. M. Campbell, who unfortunately could not be present, was read by the Secretary.

Five applications for membership were accepted and it was decided that the next meeting in October be a travelling clinic meeting.

The meeting adjourned at 5 o'clock and everyone went home feeling that he had had one of the best times every enjoyed.

There were about 20 veterinarians and their families present.

C. S. McGuire.

SOUTHERN TIER VETERINARY MEDICAL ASSOCIATION

The third regular annual meeting of the Southern Tier Veterinary Medical Association was held in Elmira July 7, 1917.

During the morning a very interesting clinic was held at the hospital of Dr. A. J. Battin, 452 W. First Street. The cases presented were varied and interesting; operations were performed.

Dinner was had at the Hotel Rathbun following which President C. D. Pearce called the meeting to order.

A count showed 38 present.

The following program of papers was presented after which there were interesting discussions:

Forage Poisoning—Infection or Poisoning. Dr. P. J. Axtell, Binghamton.

The Stallion Registration Law. Dr. J. G. Wills, Albany.

The Technique of Douching the Uterus. Dr. W. L. Williams, Ithaca.

It was voted to send $50 from the funds of the association to the aid of the French and Belgian veterinarians.

The following resolution was adopted:

WHEREAS, The conservation of the health of domesticated animals is important at all times but especially so during the war crisis in order that the meat supply may be increased;

WHEREAS: the losses from hog cholera, contagious abortion in cattle and other infectious diseases are serious factors in diminishing the supply

RESOLVED: that the members of the Southern Tier Veterinary Medical Association do what they can in eliminating these losses by advising and urging their clients that new stock be not admitted to their herds until it is shown that they are entirely free from disease or properly immunized against hog cholera, in the case of hogs; and on the other hand, to refrain, on their own part, from placing on sale any members of their own herds which are not entirely sound and which in any way are liable to disseminate disease among other herds.

At the evening session an exceedingly interesting discussion of cases was had. This discussion was opened by Dr. D. H. Udall and participated in by nearly everyone present. It was felt that this, an innovation, was an exceedingly interesting and instructive part of the meeting.

The officers elected for the coming year were as follows: Pres., Dr. A. J. Battin, Elmira; Vice-Pres., Dr. L. S. Matthews, Cooperstown; Sec. and Treas, Dr. R. R. Birch, Ithaca. Board of Censors: Drs. E. F. Vorhis, P. J. Axtell, G. T. Stone, F. D. Fordham, D. W. Clark, W. E. Muldoon. It was voted to hold the next meeting in Owego.

C. P. FITCH, Sec'y.

CENTRAL NEW YORK VETERINARY MEDICAL ASSOCIATION

The eighth annual meeting of the Central New York Veterinary Medical Association was held at Syracuse, N. Y., June 28, 1917.

A clinic, conducted at the infirmary of Dr. H. A. Turner, occupied the attention of the members during the morning session. Ten operations were performed. Lunch was served at the infirmary during the course of the clinic.

The business session opened at 3:00 o'clock P. M. at the St. Cloud Hotel, Dr. Frank Morrow, President of the association, presiding. The following members were present: Dr. H. A. Turner, Dr. Frank Morrow, Dr. W. B. Switzer, Dr. W. L. Clark, Dr. F. E. York, Dr. C. R. Baldwin, Dr. J. A. Pendergast, Dr. W. M. Pender-

gast, Dr. J. M. Currie, Dr. J. C. Stevens, Dr. E. E. Cole, Dr. J. K. Bosshart, Dr. E. E. Dooling, Dr. W. M. Sullivan, Dr. D. O'Loughlin; visitors: Dr. A. George Tegg, Rochester, Dr. Otto Faust, Poughkeepsie.

Routine business was conducted and in addition officers were elected for the ensuing year, as follows: President, Dr. W. M. Pendergast; Vice-President, Dr. J. M. Currie; Secretary-Treasurer, Dr. W. B. Switzer. Board of Censors: Dr. H. A. Turner, Dr. A. H. Ide, Dr. W. G. Hollingworth, Dr. J. C. Stevens, Dr. W. L. Clark, Dr. E. E. Dooling.

Dr. J. K. Bosshart gave a very interesting paper on the use of Formalin in the treatment of mastitis. Dr. O'Loughlin read a reprint from the *Journal* of the American Veterinary Medical Association in which he gave an instructive account of a double fracture of the pelvis in a race horse, a case which he had met in practice.

Dr. Otto Faust of Poughkeepsie was elected to honorary membership in the association.

Pursuant to a resolution passed at a preceding meeting, the secretary announced the procuring of appropriate blanks to protect the society against possible proceedings for damages in case of injury or death of animals operated upon at the clinics.

Adjournment was taken at 5:45 P. M.

W. B. SWITZER, Secretary.

KENTUCKY VETERINARY MEDICAL ASOCIATION

Meeting called to order at 10:30.

Invocation, Rev. W. R. Anderson, Shelbyville, Ky.

Address of welcome, Mayor Rothschilds, Shelbyville, Ky.

Address by Dr. A. J. Payne, B.A.I., Louisville, on Eradication of Hog Cholera.

Discussion by members of the profession.

Address by Dr. H. Jensen, Kansas City, on Black Leg.

We then proceeded to the Dairy Farms around Shelbyville, by automobile.

Banquet served at 6 P. M.

Services opened by Rev. Powell.

Dr. R. C. Moore, St. Joseph, Mo., Toastmaster.

Responses were made as follows:—Dr. D. C. Henewatt, B.A.I. Work; Dr. W. H. Simmons, State Meat Inspector, Progress of Pure Food Work in Kentucky; Dr. R. McNeal, Cattle Raising in South America; Dr. H. Jensen, Kentucky and Veterinarians; Dr. S. F. Musselman, K.V.M.A. Work; Dr. O. S. Crissler, K.V.M.A. Work and Live Stock; Hon. O. M. Phillips, Beef Cattle; Hon. M. O. Sullivan, Shelby County.

SECOND DAY:—General order of business, followed by addresses by, Drs. Jos. Hughes, H. Jensen, R. C. Moore, D. C. Henewatt.

Dr. Joseph Hughes on Lameness and Diagnosis; 1st, neurotomy and ring bone, 2nd, spavin, 3rd, shoulder, 4th, Laminitis and after results, 5th, nail puncture, knuckling, adhesion of tendons to navicular bone, 6th, atrophy postea spinatus muscles, 7th, wire cut on right hind leg; thickened condition, 8th, summer sore, 9th, spavin, 10th, ring bone versus contraction, 11th, brachial paralysis.—ankylosis.

AFTERNOON:—Two Cryptorchids, operated on by Dr. R. C. Moore, St. Joseph Veterinary College, assisted by Dr. A. S. Barnes and R. M. Hamilton.

Operation for contraction, by Dr. R. C. Moore, (Young mule).

Mr. Albert Catlett of Shelbyville, Ky., prepared foot for these operations.

Drs. Hamilton and Barnes placed the animal on the table.

Operation for contraction, (Mule).

Dr. R. C. Moore. Separation of both tendons, assisted by Drs. M. A. Purdy, J. K. Ditto, Allen S. Barnes and R. M. Hamilton.

Dr. Jos. Hughes talked on cases diagnosed at the morning session: 1st, Brachial Paralysis, Chalk talk, illustration of Brachial Plexus, Patient referred to Dr. Moore for operation on tendons, which had become contracted as a result of brachial paralysis; 2nd, Atrophy of postea spinatus; 3rd, Talk on suspensory ligaments, check leg, perforatus and perforans tendons, Injuries to thoroughbreds which retire them from track use; 4th, splints; 5th, buckshins; 6th, spavin.

Dr. H. Jensen, address on Contagious Abortion. Discussed by Dr. Good.

Operation of Tenotomy by Dr. Moore, assisted by Dr. Purdy.

Operation on mule. Growth above coronary band below pastern, assisted by Dr. Allen S. Barnês.

D. E. WESTMORELAND, Secretary.

—Deaths of human beings as well as domestic animals are caused every year by cicuta or water hemlock. This plant, growing in wet places, is widely distributed. Cases of poisoning are more frequent in the spring. The root only is poisonous.

—Of the twelve candidates taking their examinations before the Veterinary Board at Charlotte, N. C., June 26, eight are reported to have passed.

—Dr. J. R. Mahaffy of Wilmington, Del., has enlisted in the Veterinary Reserve Corps and has been ordered to Washington to report for duty. It is reported that Dr. Mahaffy is the only veterinarian in Delaware who has volunteered his services.

—Second Lieutenant Hadleigh Marsh of the Veterinary Reserve Corps, formerly of Washington, D. C., is stationed at Ft. McIntosh, Laredo, Texas.

COMMUNICATIONS

AN OPPORTUNITY FOR VETERINARIANS

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

Dear Sir: The recent announcement by the United States Government to the effect that there will shortly be a demand for federal employment of some 2500 veterinarians, distributed in the Reserve Army Veterinary Service and Bureau of Animal Industry and the indications that this demand for men trained in the veterinary profession will be even greater in the immediate future, has influenced those in authority at the Michigan Agricultural College to undertake to broaden its scope of instruction and to include work both for practicing veterinarians and students in Veterinary Medicine. While it is not intended to in any way curtail the scheduled courses for veterinary students, recent action by the State Board of Agriculture opens a way for giving a special summer school course to senior veterinary students with a view to graduating them on or about April 10, 1918, thus enabling them to complete their professional studies and be prepared for earlier entrance into the field opened by our entrance into the war. Under this plan it is proposed to begin the regular senior year work of the veterinary course on August 27th, and the college is now arranging to admit not only students from other institutions, should they desire to take up this work, but also, to make it possible for practitioners who desire to qualify for this work.

Admission into this work will be arranged under two phases. Graduates and undergraduates will be allowed to enter as members of the fourth year class if they can present the necessary educational qualifications for admission to the college and pass satisfactory examinations for all work in which they desire advanced credit, or otherwise offer certificates indicating that they have satisfactorily completed the work, in some other veterinary school whose entrance requirements and course of study are equivalent to this college. Applicants entering under this arrangement after one year of residence, and satisfactorily completing the regular senior year's work will receive the college degree.

Graduates unable to qualify as above and who desire to pursue special studies, or who wish to add to their personal knowledge will be admitted into the regular class work of the senior year or permitted to elect any other of the undergraduate subjects, which they may desire, and which are regularly taught during their period of residence. They will be given all the opportunities and facilities offered regular students insofar as these opportunities do not interfere with the instruction to the regular students. This work will be offered without any tuition to residents of Michigan other than the regular matriculation fee of five dollars ($5.00) and laboratory fees should they elect work where such fees are authorized.

The subjects that will be offered as the regular senior class work are the courses of Clinic, Parasitology, Medicine, Pathology of Infectious Diseases, Meat Inspection, Therapeutics, Special and Operative Surgery, Obstetrics and Lameness and Soundness; also underclass subjects regularly scheduled in college catalogue.

Study of the general catalog, a copy of which can be obtained upon application, will not only give the information as regards the nature of these courses, but will also enable the practitioner, who may desire to take advantage of the work, to determine in advance the date when these courses will be offered. In giving this work to veterinarians who do not enter under the regular college entrance requirements this college does not contemplate granting a degree or certificate, but contemplates giving the work entirely for the benefit that may be derived from the increased knowledge in Veterinary Science.

R. P. LYMAN.

GOOD WILL CONTRACTS HELD VALID BY WISCONSIN COURTS

Editor Journal of the American Veterinary Medical Association: Ithaca, N. Y.

Dear Sir: On March 31, 1914, Dr. William Madson, who was desirous of locating in Appleton, Wis., purchased the practice of Dr. O. N. Johnson of that city for the sum of $4500.00. Dr. Johnson had practiced there for a number of years and was quite well established but he had become interested in other lines of business and no longer cared for the ordinary life of the veterinary surgeon. So in consideration of $4500.00 he sold his veterinary practice, office fixtures, hospital and good-will to Dr. William Madson. Having decided to go out of the veterinary business, Dr. Johnson further agreed in writing that he would not again practice veterinary medicine or surgery in Appleton, or vicinity unless it would be in partnership with said Dr. Wm. Madson or to buy out the said above mentioned, Dr. Wm. Madson.

However, Dr. Johnson's visions of success in other fields did not materialize. After he was out of the veterinary business for about a year he concluded that it was not so bad after all. Somewhere he conceived the idea that such a contract as he made with Dr. Madson was invalid, and he again opened an office a couple doors from the one he had sold to Dr. Madson, and where Dr. Madson was located. Dr. Madson resorted to the courts and commenced a suit to restrain Dr. Johnson from practicing in the city of Appleton.

The Circuit Court held that the agreement was valid, and that Dr. Johnson had no right to practice or advertise himself as a veterinary surgeon in the city of Appleton or vicinity. However, Dr. Johnson was not content with this, and appealed the case to the Supreme Court of Wisconsin.

After the usual delays incident to litigation, the Supreme Court affirmed the lower court in the following decision:—

SIEBECKER JUDGE: It is well established that contracts imposing reasonable restraint upon the right to exercise ones calling, trade or profession are valid. This doctrine has been applied and upheld in this state under the varying facts and circumstances disclosed by the following cases: Fairbanks and others V. Leary, 40 Wis. 637; Washburn V. Dosch, 68 Wis. 436; Richards V. American Desk & Seating So., 87 Wis. 503; Palmer V. Toms, 96 Wis. 367; Teektonious V. Scott, 110 Wis. 441; Cottington V. Swan, 128 Wis. 321; My Laundry Co. V. Schmeling, 129 Wis. 597.

The terms of the agreement of these parties restrains defendant from practicing his profession in "Appleton or vicinity" unless he enters into partnership with the plaintiff for that purpose or purchases plaintiff's professional business. The significance of the word "vicinity" in such contracts is to be ascertained from the intent of the parties to the contract in the light of the facts and circumstances of the transaction. Burton V. Douglas, 141 Wis. 110. It appears that the defendant reopened the practice of his profession in the city of Appleton, which is specifically forbidden by the contract. Courts have sustained as valid agreements of this kind without limitation as to time in specified localities. See agreements in restraint of trade 9 Cyc. 527, paragraph (4) and note restraints limited as to space but unlimited as to time; also 6 R. C. L. sec 205. The restraint in this agreement to the affect that defendant was not to practice his profession or calling in "Appleton or vicinity" is reasonable and valid within the doctrine adhered to in the adjudications of this and other states.

By the Court: The order appealed from is affirmed.

WM. MADSON.

Editor Journal of the American Veterinary Medical Association:
Ithaca, N. Y.

Dear Sir: Will you kindly permit me (as editor of the *Veterinary Journal*) to send a message through you (the editor of the *Journal* of the American Veterinary Medical Association) to my brother members of the association to welcome them as Allies in this terrible war; and to say that the British Veterinary Profession will extend the cordial hand of welcome to an American Colleague wherever we may meet in the fight for freedom and liberty, and for the righting of the wrongs of the weaker and smaller nations who have been so ruthlessly crushed.

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.
Major Army Veterinary Corps.
Honorary Veterinary Surgeon to His Majesty the King

VETERINARY SOLIDARITY

The Illinois State Veterinary Medical Association by vote, agreed that those members that did not go into army service would look after the practice of those who did go, to the best of their ability. The work to be done on a "fifty-fifty" basis, and the proceeds to be turned over to any one the army veterinarian should designate. This arrangement will do much to solve one of the problems that confronts the average practitioner; and we trust other veterinary organizations will take similar action. Most veterinarians who go into the Veterinary Officers' Reserve Corps will make great sacrifices. Those who cannot serve their country in the army can do their bit by looking after the professional interests of those who do.

N. S. MAYO.

MISCELLANEOUS

—AMERICANISM AND PRUSSIANISM. "The foundations of our national policy will be laid in the pure and immutable principles of private morality. There exists in the course of nature an indissoluble union between virtue and happiness, between duty and advantage, between honest policy and public felicity, and the propitious smiles of heaven can never be expected on a union or government that disregards the eternal rules of order and right, which heaven itself has ordained."—George Washington's First Inaugural Address.

"We are now in a state of necessity and necessity knows no law. Our troups have occupied neutral Luxemburg and perhaps already have entered Belgium territory. Gentlemen, this is a breach of international law. The wrong—I speak openly—the wrong we hereby commit we will try to make good as soon as our military aims have been attained.

"He who is menaced as we are, and is fighting for his highest possession, can only consider how he is to hack his way through."—Chancellor Bethmann-Hollweg addressing the Reichstag, August 4, 1914.

—The following officers of the Veterinary Corps have been ordered to Fort Jay for further instructions: Capt. Joseph R. Jeffries, 1st Lieutenants Richard H. Power and Jules H. Uri.

The following officers of the Veterinary Reserve Corps have been assigned to active duty and ordered to proceed as follows. Second Lieutenants L. C. Phillipus and James W. Graham to Fort

Myer; 2d Lieutenant Roy C. Smith to Fort Sam Houston; 2d Lieutenant James R. Mahaffy to Front Royal Remount Depot; 2d Lieutenant John N. Campbell to Chicago, Ill.

—VETERINARIANS NEEDED. The College of Veterinary Science of the Philippine University offers a five-year course leading to the degree of doctor in veterinary science. There are twenty scholarships created by law and one through the generosity of Ser. Mariano Limjap valued at 35 pesos monthly—($17.50).

The demand for veterinarians has never been so great as at present. The Bureau of Science of the Department of Agriculture needs the services of veterinarians at a salary of 1.800 pesos per year. The field of private practice is almost untouched. The development of the islands depends upon agriculture; agriculture depends upon the live stock industry and this depends upon the veterinarians.

Instruction in the College of Veterinary Medicine is free to residents of the Philippines. For more information address the dean of the College of Veterinary Science, Philippine University, Manila.

EL AGRICULTOR FILIPINO,
The Philippine Agriculturist.

—Dr. R. J. Hight, a graduate of the C. V. C. and formerly Assistant State Veterinarian of Illinois, has been appointed State Veterinarian of Arizona, with headquarters at Phoenix. Dr. Hight took charge of the office May 15th.

—The twenty-sixth annual meeting (twenty-fifth anniversary) of the Missouri Veterinary Medical Association was held at Sedalia, Mo., July 25th and 26th.

—The sixteenth annual convention of the North Dakota Veterinary Association was held July 17th and 18th at the Veterinary Building, Agricultural College, Fargo, N. D.

—Dr. O. W. Anderson has removed from Chicago, Ill. to Brunswick, Nebr.

—Dr. H. O. Mantor of the B. A. I. has been transferred from Long Beach, Cal. to Beaufort, N. C.

—Dr. O. L. Tesdal has removed from Lee, Ill. to Rochelle, Ill.

—Dr. R. S. Whitney has removed from Albany to Whallonsburg, N. Y.

—Dr. R. G. McAlister is now located at Portland, Oregon.

—Dr. J. O. F. Price has been transferred from Waterloo to Lu Verne, Ia,

—Dr. I. T. Lewis, a graduate of the Kansas City Veterinary College, has located at Charlotte, N. C.

—The fourth annual meeting of the Western Veterinary Medical Association was held at Buffalo, June 29. Papers were read by Doctors Hill of Gowanda; F. E. McClelland, Buffalo; E. Rafter, Hamburg; A. Crowforth, Lockport; F. F. Fehr. Officers were elected as follows: President, J. L. Wilder, Akron; Vice-President, W. E. Frink, Batavia; Secretary, F. F. Fehr, Buffalo.

—Carbon bisulphide is being widely exploited, under various names and exorbitant prices, to farmers as a treatment for bots and worms in horses.

—A very successful meeting of the North Carolina State Veterinary Medical Association with a full and interesting program was held at Charlotte, N. C., June 27 and 28.

—Dr. V. A. Moore of Ithaca, N. Y., is at Washington, D. C., to assist in the Army Veterinary Department.

AN APPEAL

I'm only a cavalry charger,
 And I'm dying as fast as I can
(For my body is riddled with bullets—
 They've potted both me and my man)
And though I've no words to express it,
 I'm trying this message to tell
The kind folks who work for the Red Cross—
Oh, please help the Blue one as well!

My master was one in a thousand,
 And I loved him with all this poor heart
(For horses are built just like humans,
 Be kind to them—they'll do their part);
So please send out help for our wounded,
And give us a word in your prayers;
This isn't so strange as you'd fancy—
 The Russians do it in theirs.

I'm only a cavalry charger,
 And my eyes are becoming quite dim
(I really don't mind though I'm "done for,"
 So long as I'm going to him);
But first I would plead for my comrades,
 Who're dying and suffering too—
Oh, please help the poor wounded horses!
 I'm sure that you would—if you knew!

—*Scotts Greys.*

JOURNAL
OF THE
American Veterinary Medical Association
Formerly American Veterinary Review
(Original Official Organ U. S. Vet. Med. Ass'n)

PIERRE A. FISH, Editor **ITHACA, N. Y.**

VOL. LI., N. S. VOL. IV. SEPTEMBER, 1917. NO. 6.

Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

THE FIFTY-FOURTH MEETING OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

The attendance and business done at this meeting amply demonstrated the desirability of continuing the professional and scientific activities of organizations during the war period. President Cotton's address struck the keynote to which much of the subsequent business was attuned. Its essence was patriotic service, helpfulness and high standards. It was constructive and progressive and drew merited applause.

The attendance ebbed and flowed, but at the opening exercises the seating capacity of the auditorium of the Kansas City Veterinary College was well taxed. In the absence of positive figures we would estimate that the total attendance was not far below that at Detroit last year. The meetings of the various sections were well attended; the papers were of timely interest and received adequate discussion.

At the business meeting, on the afternoon of the second day, the attendance was large, as matters of importance were under con-

sideration. Numerous minor changes to the constitution and by-laws were accepted, but the amendment relating to the lowering of the educational standard for entrance received some very heated discussion. The decision, however, was to retain the high school requirements as already indicated in the by-laws. The question will again be opened as two further amendments were presented; one to lower the requirements and the other to still further advance them.

The election for president disclosed the fact that a majority of the votes were cast for Dr. F. Torrance of Canada. Dr. R. C. Moore of Missouri and Dr. C. A. Cary of Alabama also received nominations for the office. As a neighbor and ally, it was felt by many that, with the prospect of international problems with which the association might be concerned, the experience of Dr. Torrance might be of material value. Perhaps, also, it was a recognition and testimonial, at this particular time, to the valiant service rendered by the allied veterinarians in the field.

Doctors Blattenberg, Haring, Jensen, Anderson and S. H. Ward were elected vice-presidents in the order named. Dr. A. T. Kinsley of Kansas City was elected to the executive board as member at large for a period of five years. Doctors Merillat and Schneider were re-elected as secretary and treasurer respectively without opposition. The secretary's report showed a larger number of applicants than ever before and the treasurer reported a satisfactory balance in the funds of the association.

Invitations for the next meeting were numerous and, in some instances, urgent. The claims of Philadelphia, Atlanta, Columbus, Estes Park and Madison were eloquently presented by their representatives. The evening was devoted to seeing the sights and a general good time at Electric Park.

The third day of the meeting was given over to an inspection of the Armour Packing Plant. This was a point of much interest to members and visitors alike. The transformation of live stock into finished food products and various by-products showed a wonderful system of efficiency and greatly impressed those who saw the machinery of it. Not least in interest to the veterinarians, was an extensive pathologic exhibit obtained from some of the thousands of animals slaughtered at the plant. An excellent lunch was served at the plant and all appreciated the generous hospitality. In the evening a patriotic program was arranged in the

ball room of the Hotel Muehlebach. The feature of the evening was an address by the Rev. Charles C. Russell of the National Security League on "Our War and World Peace". Mr. Russell has a son in the service of his country, and his remarks held a direct and personal interest to those present. In the absence of President H. J. Waters of the Kansas State Agricultural College, Dr. W. Horace Hoskins was called upon and, with his usual eloquence, gave an able presentation of the patriotic sentiments of the association.

The important feature of the fourth day's meeting was the organization of a relief fund for the allied veterinarians, including America. This fund is based upon the voluntary contributions of its members and includes the pledges of some of the state veterinary organizations. In less than an hour the sum of $2775 was pledged. With further contributions coming in the next day, the total amount is well over $3000. The committee in charge of this fund consists of J. H. Blattenberg, Ohio, Chairman; T. E. Smith, N. J.; W. G. Hollingworth, N. Y.; M. E. Knowles, Montana; and W. H. Dalrymple, Louisiana. To Dr. Blattenberg's active method of carrying on the campaign, the successful results are largely due. Such a worthy cause met with a sympathetic response. Those members not fortunate enough to be at the meeting may do their bit by forwarding their contributions to Dr. J. H. Blattenberg, Lima, Ohio.

Thursday evening's banquet was presided over by Toastmaster W. H. Dalrymple. The veterinarian of the North; East; West; South were responded to respectively by President-elect Torrance, J. F. Winchester, G. H. Glover and R. M. Gow. Dr. J. A. Kiernan spoke for the Bureau of Animal Industry and Mrs. F. H. Schneider for "The Ladies". Concise and appropriate remarks were presented by N. S. Mayo on the Live Stock Industry, to replace Mr. Lennon, who was unable to be present. Remarks were also offered by Dr. W. H. Coon of the Health Department. Captain Schwarzkopf was not present to respond to the toast: "The Army Veterinarian". Colonel A. Olver of the British Remount Commission, however, gave an entertaining talk on "Army Veterinary Service", wherein it was brought out that whereas the equine losses to the British in the Boer War amounted to 55 per cent, the losses in the present war had fallen to less than 10 per cent, because of the improved veterinary service.

It was rumored that a Ladies' Auxiliary to the association is to be formed and that they contemplate doing their share toward the Relief Fund.

The fifth day was devoted to the clinic in which was interspersed a considerable amount of business which had overflowed from the previous sessions, somewhat to the detriment of the clinic. The clinic was interesting and held a number of the members. A more complete account is reserved for later publication.

Abundant entertainment was provided for the ladies and they, as well as the members of the association, will carry away with them many pleasant memories of the Kansas City meeting and the generous hospitality provided by the local committee. Secretary Merillat deserves hearty congratulations upon the energy he has displayed and the effort he has shown to make the meeting a success. The number of applicants for membership has been unusually large and a new record has been established. President Cotton's efforts to emphasize the patriotic side of his administration and to maintain high standards for the profession, have borne fruit beyond expectations. For him no sacrifice has been too great, no duty too onerous where the good of the association was concerned. With his committee on Army Veterinary Service, he has given unstintingly of his time and effort for the good of the country and the profession. The clouds which obscured the question of rank for the veterinary reserve corps are beginning to break away. The sun of justice is beginning to shine through and the indications are promising that the veterinarians may receive the same recognition as is granted in the dental and medical corps. His administration has been marked by patriotic service; helpfulness, as shown by the organization of the relief fund and the maintenance of high educational standards. It has been a phenomenal year. The war, thrust upon us, has increased rather than decreased the membership. It has afforded an opportunity for a display of patriotism that has, perhaps, been equalled but not exceeded by other professional organizations. So far as the officers of the association are concerned, it has demonstrated that the right men have been in the right places.

P. A. F.

EUROPEAN CHRONICLES

Bois Jerome.

Williams' Operation—It may be considered by some that all that could be said of the operation of Professor Williams has already been published and that it is comparatively of little advantage to again refer to the subject in the pages of our Journal.

Indeed the operation has been described over and over again, changes and modifications in the technic of the modus operandi have been presented, the results, the sequelae, etc.; everything has been criticized and made known; and yet, I may be pardoned if I refer here to the *Note on the Operation* which Army Major Vet. erinarian Ch. Guyon has published in the Leclainche *Revue* as I am sure it presents interesting points and offers valuable conclusions.

The Major was put in a sector where a large number of animals had been removed with the record of being *Roarers,* useless even on a walk. Most of them were draught horses, some of large and others of lighter sizes, rather strong, and again others in very poor condition. Familiar, and already well posted upon the operation, there was offered a good opportunity for a comparatively large experiment and the Major took advantage of it.

The technic of the operation presents little interest. The necessity for general anesthesia, considered useless or dangerous by some, is recommended. The animal being placed in complete dorsal position, and held by assistants, the first steps of the operation are carried out as described by different authors, the removal of the ventricular membrane is mentioned as follows: "After having tried in our previous operations the instruments recommended by Williams, Drouin and Cardiot, we now give exclusive preference to the extractor of Pecus with which, with a little practice the ventricular mucous membrane can be removed almost completely." The general after care is very simple and yet it would be an error to affirm that the operation is one "*absolutely without danger*". Hemorrhage with severe spells of coughing, accesses of suffocation, respiratory syncope, manifestations of asphyxia and some times necessity for temporary tracheotomy are accidents which must not be entirely ignored and which necessitate watching on the part of the operator. However, among the accidents likely to take place after the operation, *late respiratory syncope,* almost always fatal,

is one to be looked for, occurring ordinarily several weeks after the operation and taking place more particularly during meals, or also quite suddenly without apparent cause or any alarming manifestations a few minutes before; there is again another post-operative complication, viz: *Attacks of acute roaring,* which may be observed in operated animals toward the second month of a complete recovery. These spells occur suddenly and in a few days assume an extraordinary severity. *Chondroma* of the trachea may also occur as a complication following the temporary tracheotomy.

Besides the cases treated in private practice Major Guyon has operated on forty animals during his army services. He gives the following results: 6 radical cures; 22, marked improvement; 9 without improvement and 3 deaths.

CONCLUSIONS: 1st Williams' operation gives a successful average of about 60 to 65%. In the statistics given the word recoveries (*cures*), perhaps much abused at first, has been strictly reserved for those in which all signs of roaring had *entirely disappeared.* For the others the word improvement has seemed more convenient and true, as in the majority of cases the roaring did not disappear entirely but was more or less reduced; true recovery cases are indeed extremely rare.

2d *The classic theory of the frequency of the paralysis of the left arytenoid compared to that of the right is plainly confirmed by Williams' operation.*

3d *The severity of roaring is not always in proportion with the degree of paralysis of the arytenoids.* Some horses, roaring slightly or in a medium way do indeed present complete paralysis of the left arytenoid or paresis of the right, while loud roarers present only paralysis of the left cartilage.

4th *Williams' Operation, though contraindicated, is at least useless in animals which roar slightly; it has its true usefulness from the economic point of view, only with loud roarers.* The principal object of this elegant and rapid operation is to substitute it for permanent tracheotomy and its after care and dangers.

At any rate the American operation for chronic roarers deserves a special place in veterinary surgery and if it does not always give the marvellous results claimed by a few, it remains, nevertheless, an operation interesting from all points of view, likely to render useful horses which otherwise would have been condemned to the continued carrying of the old tracheotomy tube.

Epizootic Lymphangitis—Our American confreres have full knowledge of this affection and if they have not had the occasion of seeing it in their practice at home, now that some of them may come over to France, their chances of meeting with the disease will be frequent.

These remarks were made to me lately by Dr. Crawford, a graduate from the Veterinary College of Philadelphia, whom I had the pleasure to meet. He was anxious to see some cases of epizootic lymphangitis and it was my good fortune to place him in the hands of a French confrére who, I hope, satisfied his desires.

European veterinary journals, at least the French and English, have had many articles written on the disease; its history, etiology, manifestations, etc., and it would require much writing and perhaps repetition to consider them here. Many authorities on the subject have spoken through our professional press and recently among them I find a long statement by Prof. Charmoy of Alfort, now doing duty in the army as Veterinary Major. Remarks are made on the *Cryptococcus Farciminosus of Rivolta* and its effects when once in the animal organism, where its entrance was made through the abrasion of the skin, no matter how small; on the changes that follow, the formation of cords, of buds, of lymphatic swellings, etc., all are considered.

The progress of the disease is very variable, slow in some cases, very rapid in others. Relapses are frequent.

The principal lesions are those of the skin and are well known and are fully described.

The clinical diagnosis is generally easy to make, thanks to the disposition of the abscesses, the character of the ulcerations, the aspect of the lymphatic cords. Doubtful cases can be eliminated by the examination of the discharge where the cryptococcus can be easily detected.

In the differential diagnosis, glanders must first be eliminated by the aspect of the ulcerations, and if necessary by the mallein test.

The prognosis varies according to the localization of the manifestations, when on the head, the neck or trunk they can be cured easily, when on the extremities the cure is more difficult, especially with the hind legs.

The treatment recommended by Major Charmoy, among the many, has for its basis the cauterization with the actual cautery

and he gives the description of the minute manner in which he proceeds in many of the cases, of which he presents also a detailed list.

"In all cases, the animal must be placed in the decubital position, as this is the only possible way to operate safely and conveniently. The lesions of the head and body as well as those of the external face of the legs present no difficulty. To operate on the internal face, with the animal down, the leg, taken from the hobble, is secured on the anterior or posterior corresponding, so as to expose it as much as possible. The lymphatic cords of the internal face of the thigh and of the inguinal region or their abscesses demand that the leg should be carried in great abduction as in the position for operation of inguinal hernia or for cryptorchidism.

The heated, ordinary pointed cautery is thrust into the cavity of each abscess, the opening of each ulceration, every prominent swelling of a lymphatic, where pus is always found more or less deeply situated. The borders and the bottom of the ulcers are freely cauterized and the point of the instrument carried in the two directions of the cavity of the vessel.

The second step of the operation consists in the application of points of fire, fine and penetrating, one centimeter apart, all around the diseased part, which according to the condition of the case may require two, three or even four rows of points of fire so as to limit the possibility of the extension of the diseased process. Sometimes when on the legs, the abscesses are too numerous or too close to each other, cauterization in points and in lines may be resorted to. Should a large vein be opened in this application, a simple knot as the one used in phlebotomy is sufficient to stop the hemorrhage.

A stiff friction of blister ointment is then applied over the whole of the cauterized surface. The next day and also the following the reaction is enormous. The region is very much swollen and becomes the seat of a more or less abundant discharge and towards the 6th or 7th day all subside gradually. A coat of vaseline and a few washings with soap will clean and remove all the scabs formed. A saturated alcoholic solution of picric acid or of methylene blue, dusting with powdered sulphur, boric acid or charcoal, complete the treatment.

Serum Treatment of Wounds—In my last chronicle, after a minute consideration of the value, indications, effects and results obtained by the use of the serum treatment of wounds with polyvalent serum, I concluded that the professional journals were offering to their readers the reports of many cases recorded by physicians as well as by veterinarians from which I intended to extract a few for the benefit of the readers of the *Journal*. When I came to investigate what I might gather, I found so many that I am sure our worthy editor would object to the space my reproduction would require. From all that I have to select I think the report published in the *Revue Generale* by Army Veterinarians A. Guillaume and G. Bittorer will, with their conclusions, be of sufficient interest.

In the treatment of the numerous wounds they have had occasion to examine, they have noticed that when the wounds were serious, the chemical antiseptic treatment did not always give the good results that might be expected. Nothwithstanding most attentive and long care, recovery was obtained with difficulty; no matter what antiseptics were used or what surgical care given, lesions would often grow worse instead of improving and then it was decided to experiment with the serum, and their reports refer to the results they have obtained.

The serum (Leclainche and Vallée) was used by them only in serious and severe cases, which had proved rebellious to the ordinary methods of treatment. The cases on which they have written were selected from the most serious and difficult that came to them.

It would prove tedious to describe all the cases in detail or to mention the details resorted to. I will only indicate the nature of the case, it being understood that the application of the polyvalent serum finally brought recovery. Of course the time and treatment varied according to the nature, extent and condition of the diseased process.

There are four cases of wounds, injuries, abscesses and necrosed lesions of the withers. They were all deep, anfractuous, fistular and phlegmonous with necrosis of the tissues, aponeurosis, bony, etc. With all, the results were perfect. Then cases of wounds of the ribs with necrosis, of the back with deep suppuration, of a fistulous wound by a projectile, deep on the shoulder, one of the sternum, of the haunch, of some articulations, viz., the right elbow, of gangrenous dermatitis, of the extremities, of cuta-

neous quittor, of lymphatic structures, etc. The results of these complicated cases were all entirely satisfactory and as a conclusion to their article these army veterinarians say:

"The examination of these observations give marked evidence of the certain therapeutic effects of the serum, remarkable by constant and rapid improvement, after a first dressing.

(A) *Immediate effects.* In the first place there is the early *regression* of the inflammatory symptoms, which are sometimes alarming and the characteristics of which are modified.

1st—*Pain* is reduced, and there is a quick return of movement and improved general aspect.

2d—*Swelling*—Its disappearance and that of all lymphangitis.

3d—*Suppuration*—Less abundant; odorless and soon replaced by a rosy serosity. *Coagulating* on the borders of the wound.

(B) *General Condition*—Return of normal temperature.

(*Consecutive effects.*) *Repairing Action* accompanying and following resolution, and manifested first by the apposition of *regularly fine and dense granulating processes of repair followed by a normal final cicatrization.*"

ANTIPYOGENIC POLYVALENT SERUM—Speaking this time of polyvalent serum I must no longer refer to what has been done in France by Leclainche and Vallée, whose usefulness is recognized by the entire press of that country, human as well as veterinary. I will consider the work done in Italy and the results that have already been recorded.

Two veterinarians, Prof. Lanfranchi and Finzi, whom I have already introduced to our readers by abstracts of some of their work, inspired by the work done by the French have also prepared a serum, for which, according to the *Revue* of Panisset, they use twenty varieties of microbes of various species: *Bacterium pyocyaneus, Staphylococcus aureus, S. citreus and S. albus, Streptococcus of human and equine origin, Coli, Paratyphoid A and B,* and some anaerobic species *Perfringens* and *Septic vibrio.* They keep adding constantly to the number of varieties which must serve for immunization, principally by the isolated microbes from war wounds.

The serum of Lanfranchi is slightly bactericidal for the pyocyaneus and staphylococcus and is possessed of curative and pre-

ventive properties for the streptococcus, the coli bacillus and the paratyphoid B.

Employed in the treatment of wounds which are not infected, it prevents all possible complications, insures a more rapid cicatrization of the tissues and in infected wounds it causes a physiological antisepsis, characterized by an immediate change in the suppuration and brings on a more rapid cicatrization.

Principally recommended in wounds of the battle field, it may also be used for the prevention of tetanus and against the development of gaseous gangrene.

The Italian journals begin to give this serum the notice it seems to deserve. In *Il Nuovo Ercolani,* Dr. Mensa, who has used it extensively, speaks of its antibacterial power in general and of its antipyogenic property in particular, which he considers preventive as well as curative. He has used it in local applications, in sub-cutaneous and in intramuscular injections. In many cases he has obtained recoveries by first intention. In foot operations with much division of tissues, the serum has prevented the suppuration and also articular complications. In applying compresses of the serum on regions treated with deep punctured points of cautery he has promoted an aseptic inflammatory reaction most beneficial. For deep sutures he has used silk, which had been soaked or kept in the serum, and he has never seen any complications.

For Dr. Mensa, the serum assists the phagocytic action. It is able to modify the activity of the wound in which the granulating is slow and the work of repair deficient. It modifies the repair and regeneration of the tissues and promotes the elimination of necrotic elements. It also has an hemostatic action, well marked on fresh wounds. The efficiency of the serum is greater on mucous membranes than on the integument.

Sub-cutaneous injections of 10—20—50 c.c. have given excellent results in cases of rhino-pharyngitis, also in adenitis of strangles, in conjunctivitis, in closed fractures of the facial bones, sinusitis, in diseased withers, etc.

Other cases are also found in the Italian press where the benefits of the use of the serum are mentioned.

A Large Aegagropile—Hair balls are quite frequent among our domestic animals. If they are, very often, only post mortem

surprises and very seldom the occasion for a diagnosis during life and an urgent surgical interference, they are not entirely ignored in the annals of human surgery.

I have had occasion to read, in medical journals, records of aegagropile operated upon, but none probably so interesting as the one the *Presse Medicale* published in one of its last issues.

It was indeed a very curious observation, obtained from a four-year-old child, who was relieved by gastrotomy of a very large tumor filling the stomach entirely. The history was peculiar.

When the child was 3 years old she was first troubled with signs of indigestion. Her condition became so serious that radiography was resorted to, to help the diagnosis. The result was negative. A laparotomy of exploration was performed and the surgeon got the impression that the child had a strangulated intestinal loop, which he relieved. A noticeable improvement followed this operation but, after some time, the symptoms having returned more severely, another examination revealed the presence of a tumor, as big as a large pear and which was suspected to be of tuberculous origin. An heliotherapic treatment was instituted, which of course gave no results and it was then that by the reading of another case published recently, that careful inquiry brought out the facts that it had been noticed by the parents of the child that she was losing her hair during the night, that she was pulling it out. Hairs had been observed also in her fecal passages. She had also eaten pieces of sponge. The diagnosis was then easily made, that of a hair ball. The stomach was opened, the tumor removed and recovery followed.

The extracted tumor formed a mass about 36 centimeters long, 5 wide and 4 thick. It had the shape of the stomach and had a peduncle formed by a cylinder 15 centimeters long representing the mould of the duodeno-jejunum and this was continued by a small cord 2 centimeters in diameter. The tumor was formed of hairs, threads of wool and cords of various colors.

In dogs with long hair, similar conditions may have been met and our confréres who make dog practice their specialty may be able to mention cases of like nature.

SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

REVUE GENERALE DE MEDECINE VETERINAIRE—May 15th. The use of a new metallic dressing. Vesicular stomatitis of horses. (O) Traumatic pleurisy in a horse.

RECUEIL DE MEDECINE VETERINAIRE. (April and May). The cancer of the thyroid gland. (X) On epizootic lymphangitis. (O) Laceration of the stomach and pyloric cancer in a mule. (O) Acute peritonitis by bursting of an abscess in a steer. (O) Curious anomaly of the lachrymal duct in a horse.

VETERINARY NEWS. Surgical condition encountered in canine practice. An interesting monorchid—Pasteur's versus British tuberculin. May 26 Eclampsia in dogs.

VETERINARY RECORD. (O) Melanotic sarcoma in a horse. (O) Entamebic dysentery in the dog. (O) Milk fever in a goat. (June 9th) (O) Tuberculosis in the horse.

VETERINARY JOURNAL. (June) Dietetic value of wheat bran. Intra-dermo-palpebral mallein test for glanders. (O) Fracture of the tibia. Case of spurious hermaphroditism. (O) Equine scabies in the mouse. Castrating ropes.

IL NUOVO ERCOLANI (May 15). Spirochetae observed in a mole. A primitive sarcoma of the radius in a dog. (June) Ascending keraphyllocele in the horse.

CLINICA VETERINARIA. The lesions due to the bacillus of necrosis in domestic animals.

CORNELL VETERINARIAN. Sterility of cattle and methods of treatment. Diseases of new born calves. Equine infectious ophthalmia.

BIBLIOGRAPHIC NOTICES. University of Pennsylvania—School of veterinary medicine. Announcement of the session 1917-1918.

Collected Papers from the Research Laboratory of Parke, Davis & Co. Dr. E. M. Houghton, Director. In this 4th volume of the publication from the Director of the Laboratory are presented a series of reprints from the various journals where the original papers were published in 1915. This publication is worthy of the works collected and makes a valuable addition to the library of any scientific medical or veterinary practitioner.

REPORT OF THE CONGRESS HIPPIQUE FOR 1914. In this there are papers which were offered by veterinarians at the general meeting and to which later on, I will call the attention of our readers, viz: (X) On stallion carriers of infectious germs by Director Vallée and (X) On the surgical treatment of chronic roaring of horses by Dr. Fontaine.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

—Dr. D. E. Craig, formerly of Edmore, N. D., is now located at Mossbank, Sask., Canada.

STUDIES IN FORAGE POISONING V*

A PRELIMINARY REPORT ON AN ANAEROBIC BACILLUS OF ETIOLOGIC SIGNIFICANCE

Robert Graham, A. L. Brueckner, and R. L. Pontius

Bulletin No. 207 of the Kentucky Agricultural Experiment Station is devoted to experimental studies dealing with the cause of forage poisoning. It is a technical bulletin as the cause of a disease is necessarily a technical subject, yet it has an exceedingly practical bearing upon the live stock industry in the ultimate control of this disease. Forage poisoning is also known as cerebrospinal meningitis, cerebritis, staggers, et cetera, and is prevalent throughout the Middle West. The cause of this disease in live stock has remained an open question, yet moldy feed has been considered by some the exciting factor. Laboratory workers, both federal and state, inform us that the experimental feeding of various suspected molds found upon poisonous feed has not been consistently productive of the disease. No denial is made of the common presence of molds in some feeds that apparently contain the cause of forage poisoning, yet the disease-producing power of molds existing upon feeds, independent of other factors, has been seriously questioned by many investigators. That certain molds may favor the development of the primary cause of this disease is brought out by experimental tests at the Kentucky Station, and the reader is left to infer that bacterial toxins or poisons capable of causing clinical forage poisoning may readily develop in association with molds under laboratory conditions.

The Laboratory of Animal Pathology of the Kentucky Station from which this work emanates has by reason of the numerous natural outbreaks of forage poisoning in the Blue Grass Region had excellent opportunity of observing the disease. An oat hay obtained from the Griffith Brothers stock farm near Lexington, Ky., was found by feeding tests to incorporate the causative factor. The disease was consistently produced in horses by feeding the hay and also by allowing horses to consume water in which the oat hay had been immersed. A liberal amount of the oat hay in question provided material for experimental studies for a period of two years, during which time various observations upon the dis-

*Bulletin No. 207, Kentucky Agricultural Experiment Station, State University, Lexington.

ease were made. Various microorganisms were isolated from the oat hay which proved to be non-pathogenic. The investigators were able, however, to isolate a toxin-producing germ from the oats which resembled one of the germs (*Bacillus botulinus*) long known to cause meat poisoning in man. In 1901 the late Dr. Leonard Pearson of the University of Pennsylvania suggested that forage poisoning in animals possessed a certain clinical analogy to meat poisoning in man. This theory has received consideration by Drs. Mohler, Buckley and Shippen of the Bureau of Animal Industry, who report the fatal effect produced by *B. botulinus* when fed to horses and mules. However, it has remained for Graham and his co-workers at the Kentucky Station to furnish specific evidence of such a correlation by isolating an organism resembling *B. botulinus* from a poisonous oat hay. This organism upon being artificially grown in the laboratory and fed to horses produced clinical forage poisoning and death.

In studying the relation between the germ isolated from the oat hay and *B. botulinus*, the writers resorted to the practical application of serum made from *B. botulinus*. It was found that botulism antitoxin protected horses and guinea pigs against a fatal artificial infection of the organism isolated from the oat hay and also proved efficacious in protecting horses drinking water in which the oat hay had been immersed.

These investigations were also continued in the examination of silage which produced death when fed to horses. From this silage a similar disease-producing germ was isolated. Similar results were obtained in protecting guinea pigs and horses against a fatal artificial infection of the organism isolated from the silage by the use of botulism antitoxic serum.

The theory that poison-producing organisms of the type causing meat poisoning in man must of necessity develop upon meat products is apparently not well founded, as laboratory evidence indicates that corn silage decoction, as well as other forage extracts, furnishes favorable food for their growth in the laboratory. The presence of this type of organism in nature upon feeds which were found to produce forage poisoning is indisputable evidence. The possibility still remains that there may be several causes of forage poisoning, yet the establishment of one etiologic factor, together with a reliable serum treatment, should prove valuable in the ultimate control of this disease.

TUBERCULOSIS IN CARNIVOROUS ANIMALS*

W. Reid Blair, D. V. Sc., New York, N. Y.

The identity of tuberculosis in human beings, and in certain domestic animals closely associated with man, and the possibility of one infecting the other, renders this disease of the greatest importance to us as veterinarians, and to all students of comparative medicine and pathology.

During the past few years a considerable amount of literature has appeared on tuberculosis of the dog and cat. It is principally due to the work of Eber, Jensen, Cadiot, Douville, Hebrant and Antoine that the study of this disease in the dog and cat has been placed on a firm basis. Professor Eber, the famous tuberculosis expert, and the Director of the Veterinary Institute Laboratories at Leipsic has been working for a number of years on the relationship of the various types of tubercle bacilli. His researches furnish abundant evidence that the two types of tubercle bacilli, the human and the bovine, are not types of subspecies with constant characters, but rather varieties of one and the same bacillus, with relatively variable characters. He recognizes that the bacilli cultivated directly from the human or bovine sources possess certain biological characteristics which permit of a distinction, in the majority of cases, between the human and bovine types.

In his experimental work in carrying the human type tubercle bacillus through guinea pigs, calves and cattle, Professor Eber succeeded repeatedly in changing the morphological characters of the human bacillus to that of the bovine type. This work Professor Eber has splendidly demonstrated by means of gross pathological specimens showing the characteristic lesions through the successive stages.

In a number of my cases the tubercle bacilli were demonstrated by cultural and inoculation experiments to be of the human type. Except in two instances all the dogs and cats which I have examined, and recorded in this paper were house pets, and in the cases of at least three dogs and one cat the owners of the animals, I have good reason to believe were suffering from some form of tuberculosis, generally pulmonary.

*Presented at the conference for veterinarians, Ithaca, N. Y., Jan. 1917.

METHODS OF INFECTION. In a large percentage of the cases examined the lungs with their lymph glands, especially the lymph nodes situated at the bifurcation of the trachea showed extensive tubercular deposits, while other lymphatic modes were edematous or in the process of caseation. In many cases, primary infection doubtlessly takes place by way of the respiratory tract. It seems to me probable that tubercle bacilli enter the lungs and pass to the communicating glands without giving rise to preliminary lesions in the organs with which they first come in contact.

In other cases primary invasions take place by way of the intestinal canal through bacilli taken in with food or contaminated drinking water. Primary invasion by way of the intestinal canal is not, in my judgment, the common source of invasion, but that the intestines and abdominal organs are infected secondarily through the breaking down of tubercular deposits in the lungs finding their way into the bronchial tubes, finally reaching the throat, the animals swallowing the secretions containing the bacilli in great numbers, some of which would doubtless escape the action of the gastric juices, pass on to the intestines, and if in sufficient numbers produce tubercular enteritis, or they might pass to the mesenteric lymph glands without producing any lesions whatever in the intestines.

Experimental evidence apparently shows that a relatively large number of tubercle bacilli are necessary to experimentally infect healthy animals by ingestion. Probably if the mucous membrane be not intact, a smaller number of the bacilli would suffice.

The rarity or total abscence of tubercular lesions in the stomach would indicate that the gastric juice possesses power to prevent the growth of the bacilli.

My study of tuberculosis among domestic and wild carnivorous animals has been of particular interest, and certain facts have been apparently established in connection with this disease. The general character of the lesions produced by tuberculosis affecting these animals corresponds very closely to those of the human, and the bacilli found also simulate morphologically those of the human infection. Chronic tubercular lesions are much less frequent in the wild carnivorous animals in confinement. Healed tubercular lesions have been frequently observed in the lungs of dogs; but I have never noted any evidences of the pronounced fibroid changes of pulmonary tuberculosis in any of the wild species of carnivorous animals. I infer from these facts that the disease is of a much

more virulent type in the carnivores, and that the rule is death in infected animals, while in man the average case recovers.

In man, one frequently finds healed tubercular lesions in the tissues, particularly the lungs. In man, dying of other than tubercular disease healed tubercles are found to be present in from fifty per cent to eighty percent of cases.

This observation may be compared with the characteristics of human tuberculosis when it affects a primitive people particularly one in whom tubercular infections are infrequent in their natural habitat. We may thus compare the tuberculosis of wild carnivores to that of the Indians, of the Esquimaux, or even to that of the negro in his native land. We know that tuberculosis in these peoples practically always assures a virulent form, and that the rule is death.

It is practically certain that no wild carnivore has ever died of tuberculosis in its wild habitat, so that when it is brought into captivity, it possesses no natural immunity to tuberculosis, such as the domestic species has acquired, as a result of long and intimate association with civilization.

From my observations in regard to tuberculosis in wild animals, I am thoroughly convinced that the offspring of wild animals in captivity are less liable to succumb to the infection than those animals coming direct from the jungle, that is, of course, assuming the conditions of infection and environment to be the same. It will be of interest in this connection to cite a case of pulmonary tuberculosis occurring in a recently captured Arctic seal. This seal was captured by a party of American sportsmen who were on a hunting expedition in the Arctic regions, and on their return deposited the seal in the Zoological Park. From the date of capture to the time the animal was deposited in the Park was exactly six weeks, during which time it was on board ship.

On its arrival at the Park it was noticed to be in ill health, had refused all food, and finally died within a few days. The autopsy revealed very extensive miliary tuberculosis throughout the lungs. It is somewhat interesting to consider the infection of this animal, recently from the Arctic regions where tuberculosis is unknown, with the similar fate of the Exquimaux who were brought to this country by Lieutenant Peary, all of whom contracted tuberculosis within a few days after landing. The great rapidity of these cases is most instructive in that it teaches us to especially guard against

the possibility of infections for animals coming from a widely altered habitat.

SYMPTOMS—DOGS. The disease as seen in the dog generally runs a chronic course, but it may at any time assume an acute form.

In practically all cases of tuberculosis in the dog the clinical evidences of the disease in the early stages are manifested by symptoms, which, in themselves are not characteristic.

In some instances there is an occasional short cough, which may increase and continue for several weeks or even months without other marked symptoms becoming manifest. After an interval of several weeks, in the majority of cases, more definite symptoms of tuberculosis make their appearance. The owner will tell you that the dog has a capricious appetite, and that after slight exertion appears weak and exhausted, and that it is slowly losing weight. Later the soft parts of the scapula and dorsal region become shrunken, allowing the bony parts to stand out prominently. The flanks seem to be slightly fallen in, and the abdomen appears pendulous. The mucous membranes are pale, and the facial expression is dull and stupid. The coat is dull and erect giving the animal an unthrifty appearance. There is generally a steady loss of condition even though the appetite remains good.

Pulmonary tuberculosis begins with a short dry cough which frequently leads the animal to vomit. Later the cough becomes more frequent and the respiration more and more labored. Dry and moist rales may now be heard on auscultation. When the pleura is involved, in addition to the friction sound, there is pronounced bronchial breathing with fixed or rigid thoracic walls often accompanied by moaning and groaning at each respiratory movement. Sensitiveness of the thoracic wall is manifested on percussion.

If there is much fluid in the pleural cavity, the flanks heave or have a pumping-like action, accompanied by ballooning of the cheeks. The fluid from the thoracic or abdominal cavities is blood stained serum, and quickly consolidates on exposure to the air. This condition I consider an important diagnostic feature of tuberculosis in the dog.

In two of my cases symptoms of accumulations of considerable quantities of serous exudation in the thoracic cavity were apparent in the early stages of pulmonary tuberculosis. In the advanced stages of this disease in the dog, the greatly emaciated and

exhausted animals are seized with spasmodic coughing. When the bronchial or mediastinal glands are affected, they are generally greatly enlarged, and the paroxysms of coughing are frequent or nearly constant.

The slightest exertion causes the dog great distress. Fainting spells are common at this stage of the disease, and are brought on by slight excitement. Excessive thirst and polyuria are also prominent symptoms. In some cases tubercular dogs may live for many months without showing great disturbance, while in other cases death is quickly brought about by exposure resulting in pneumonia. In these instances the dog rarely flexes its head, and the neck is always extended. There is always a great variation in the temperature, although rarely over 103.5°F. You may frequently find the temperature subnormal. The heart pulsations are generally weak and rapid. When the pleura is involved, changes in the pericardium itself are present.

Tuberculosis of the abdominal organs is indicated in a general way by ascites and impaired nutrition, as a result of which the affected animals become emaciated and anemic.

Aspirating the fluid from the abdominal cavity gives only temporary relief, making it necessary to repeat the operation at intervals of a week to ten days. The fluid obtained is nearly always blood stained and quickly solidifies on exposure to the air. If the liver, lymph glands, and spleen are involved, the enlarged tubercular nodules can generally be felt through the abdominal walls by careful palpation. The bowel movements are irregular, diarrhea with much mucus is frequently present.

Believing that you will derive more benefit from the reporting of a few concrete cases of tuberculosis in the dog, which have come under my personal observation during the past ten years, I would offer the following case reports from my records:—

Case No. 1: Cocker Spaniel, male, four years old. Had been for the past three years, the constant companion of his owner, who was suffering from pulmonary tuberculosis, and was at the time of the animal's death, an inmate of the Seton Home for Consumptives in New York City.

When the dog was examined it was suffering from pneumonia, pleurisy, and ascites. Was in fair condition of flesh, but appeared much older than four years. The dog died two days later, and on autopsy showed extensive generalized tuberculosis. The lungs

were greatly congested and showed chronic caseated tubercles; the heart and pericardium, extensive tubercular deposits, with adhesions to the lungs and myocardium. There were about three quarts of bloody serous fluid in the thorax. The pleura showed numerous small miliary tubercles. The anterior mediastinal lymph gland was greatly enlarged and showed numerous areas of softening.

The liver was greatly enlarged and covered with small miliary tubercles. There was a great amount of fluid in the abdominal cavity. The spleen was normal. The mesenteric lymph glands were enlarged and edematous. The right kidney showed several tubercular foci about ½ inch in diameter. The diseased organs were placed at the disposal of Dr. Park, of the New York Health Department, who demonstrated the tubercle bacilli in the lesions from the different organs to be of the human type.

CASE NO. 2: English Bull, male, two years and eleven months old, owned by Mr. S., New York City. In good health the dog weighed fifty pounds, and was very active. Early in April he got into a fight and after the owner separated the contestants, his dog collapsed (fainted). Soon after this date the dog began to lose weight, and as the thinness became noticeable, the owner suspected the dog had worms and treated him for them, but none were found.

On January 24th I saw the dog for the first time. There was a well marked broncho-pneumonia present with considerable pleurisy. With treatment the animal made a seemingly good recovery, but convalescence was slow. Several weeks later, I was called again, the owner giving me a history of fainting spells on slight excitement. The appetite was normal in every respect. On microscopic examination of feces no ova of parasites were found. Blood smears showed extreme anemia. No ova of *Filaria immitis* were found, although I suspected these blood worms on account of the frequent fainting spells. The lungs were congested, pulse irregular and rapid. Dog again showed improvement after administration of strychnine, iron and arsenic. For several weeks the dog showed some improvement in spirits, but none in flesh. Liver was larger than normal, as well as spleen. Spleen being enlarged, I suspected leukemia, but the blood examination did not assist in this opinion. This dog was exhibited at the State Veterinary Society meeting in Brooklyn. No diagnosis was made. Early in November, I again saw the dog, and he had emaciated greatly. Now had no difficulty in feeling nodules on the surface of the spleen and liver.

Called Dr. Mangan in consultation telling him that I suspected tuberculosis.

On November 7th this animal was photographed and destroyed.

Post Mortem Examination. The lungs were congested and presented fibrous miliary tubercles scattered uniformly throughout. The bronchial and mediastinal lymph glands enlarged throughout. The liver weighed five pounds and large tubercular masses present 1″ x 2″, 3″ x 4½″ in size. The kidneys showed several miliary tubercles. The spleen slightly enlarged, and with few tubercles.

The large and small intestines showed tubercular ulceration.

The microscopic examination of the sections from the lungs, liver and other organs showed typical tubercular lesions.

CASE No. 3: Bull Terrier, male, 3 years old, had been treated for bronchitis for several weeks, apparently without improvement, appetite good. When presented to me, animal showed emaciation, labored breathing, temperature 103°F. Anemia. On palpation I was able to detect nodules on the liver without difficulty. Advised destruction of animal, owner consenting. Autopsy showed generalized tuberculosis with lesions showing in lungs, pericardium, bronchial lymph nodes, liver, spleen, kidneys.

CASE No. 6: A very large brindle bull dog, male, owned by Mrs. F., of New York City. This animal was nine years old, very fat. Was consulted in May on account of the animal having chronic cough, occasional diarrhea, and easily fatigued on slight exertion. Temperature 103°, rapid respiration, heart irregularly intermittent. Mucous membranes pale. Examined stools for parasites, negative. Gave codeine for the cough, and regulated diet, eliminating all starch substances which formerly made up the principal diet. From May until September did not see this dog again, but when I was called in, early in September, found a very greatly emaciated animal with a history of chronic cough, and fainting spells brought on by the animal going up two flights of stairs. Anemia and jaundice marked, pronounced pleurisy and bronchitis. Found nodules on the surface of the liver, diagnosed tuberculosis, and advised chloroform. The owner did not consent to this but wished the animal to die a natural death. About two weeks later the owner telephoned, wishing the animal chloroformed, but before I could reach the house the dog had died.

CASE No. 7: French Bull Terrier, male, aged 12 years, owned by Mr. S., of New York City, a very healthy, well nourished, ac-

tive animal, suddenly developed asthmatic symptoms and ascites. Two quarts of blood-stained serum were taken from the abdomen which seemed to give relief for about four weeks when the dog was again returned on account of excessive fluid in the abdomen. The owner was advised that it was useless to treat the animal, but on account of sentiment, refused to have it destroyed, and insisted upon treatment as long as the animal would live without apparent distress.

At intervals of about ten days, large amounts of fluid were taken from the animal's abdomen. From the second tapping the dog showed progressive emaciation, and finally after several months, I was able by palpation to detect the nodules on the surface of the liver. The dog finally died from asphyxiation due to acute edema of the lungs. The autopsy showed generalized lymphatic tuberculosis.

Case No. 9: French Poodle, 6 years old, female, had been in poor condition for several months. Suffered from occasional diarrhea, but as microscopic examination of the feces showed that the animal was infested with whip-worms the diarrheal condition was attributed to these parasites. The animal, after a full meal on a very hot day, had been let out in an exercising field, had a convulsion, and died without gaining consciousness, considerable blood coming from the nostrils.

The autopsy showed death to be due to acute dilatation of the heart as a result of acute indigestion. The following condition of tuberculosis was found:

The pleura showed very extensive thickening with a great many pearly like tubercles scattered throughout the surface. The pericardium was also thickened and tubercles numerous. The lungs were congested and edematous and contained many tubercles with numerous irregular shaped cavities, varying in size from $\frac{1}{8}$ to $\frac{1}{2}$ inch in diameter. The cavities were generally collapsed and were lined with necrotic tissue which had a dirty greyish oily appearance. The bronchial and mediastinal lymph glands were enlarged and showed areas of softening. The liver was congested but not tubercular. The spleen showed four tubercles about the size of a pea on the surface of the organ. These were not close together.

The kidneys were congested but no tubercles were found. The mesenteric lymph nodes were enlarged, reddish in appearance and edematous on section. None showed any necrosis. The intestines

showed numerous whip-worms but no evidence of tubercular ulceration.

CASE No. 14: Old English Sheep Dog, female, age 7 years, owned by Mr. M., of New Jersey. This animal began to fail in condition during the winter of 1915, and to show later evidences of extreme anemia and eczema. This animal had had irregular periods of estrum, and while served by a number of different sires, failed to prove in whelp. In February 1916, I was called, found the animal suffering from a catarrhal tubercular metritis, and very ill. I suggested spaying, but as the owner could not show or breed the animal after such an operation, and since he was not otherwise particularly attached to the animal, he did not look with favor on such an operation.

No permanent relief was afforded from treatment, and the dog gradually emaciated until November when I found in addition to the involved uterine horns, an enlarged spleen and liver, the latter being distinctly nodular and sensitive to pressure. I told the owner that the animal would die very shortly, and then he requested an operation. I suggested an X-Ray first, and this was readily agreed to, and arrangements were made for this two days later, and on the following day, the operation was performed, the owner and kennel manager being present.

The radiographs and subsequent operation proved the correctness of my diagnosis.

The operation revealed an extensive tuberculosis of the liver, spleen and lymphatic glands.

LESIONS OF TUBERCULOSIS IN THE DOG. The lesions of tuberculosis of the dog are found affecting almost all of the organs of the thoracic and abdominal cavities, but the organs most frequently affected appear to be the lungs, pleura, lymphatic glands of the thoracic regions, and the liver.

The lung tubercles are generally of a greyish color and of a fibrous consistency. They may undergo softening, and then the centres of the tubercles contain pus. In some cases typical miliary tubercles, resembling the same type of the disease in the human, are seen, the lesions being scattered throughout the substance of both lungs. The pleural cavity frequently contains a large quantity of amber colored serous fluid. The lesions on the pleura consist of thickening with large irregular masses, having on their surface firm granulations resembling miliary tubercles found else-

where. The pericardium shows similar lesions, and the pericardial sac may contain a considerable quantity of blood-stained serous fluid.

The lymphatic glands, especially the bronchial and mediastinal, are generally enlarged whenever the organs in the thoracic cavity are involved. Sometimes these glands are enlarged to such an extent as to give rise to the opinion that they are new growths, and they have doubtless been mistaken for sarcoma. The lymphatic glands are sometimes firm or fibrous in consistence, but they more frequently undergo softening in the centre, and on section show a sticky yellowish or milky fluid, or a cheesy mass.

The abdominal cavity may contain several quarts of yellowish blood-stained fluid. The peritoneum shows typical miliary tubercles resembling the pearly lesions so often found in tuberculosis of cattle.

The liver, next to the lungs is most frequently the seat of tuberculosis. The tubercles here are greyish or whitish in appearance, some of them fibrous and firm, and varying in size from that of a pea to an orange; some of these tubercles bulging out on the surface to such an extent that no difficulty is experienced in detecting them on palpation.

The kidneys show various sized tubercular masses generally confined to the cortex. Some have been found to occupy one-third of the kidney structure.

Tuberculosis in Domestic Cats. The opportunities for studying tuberculosis in the domestic cat in my experience have not been good, and when a veterinarian is called, he usually finds the cat in a greatly debilitated condition, showing extreme emaciation and anemia. The respirations are labored, the pulse weak and the temperature subnormal. The loss of flesh and the flaccid condition of the abdominal muscles will permit of abdominal palpation; and this frequently enables one to detect alterations in the kidney, liver, and abdominal lymph glands. The owner will generally give you a history of the animal's ill health for a period extending over several months.

The chief difference in the cat's habits noted are dullness or drowsiness and its disinclination to play or move about, the varying appetite, and a wheezy cough. Another symptom which I have noted is sunken eyes and the yellowish discoloration and bloodless appearance of the conjunctiva.

The lesions of tuberculosis in the domestic cat, in my experience, have been located principally in the abdominal organs, the lymphatic nodes, kidneys, peritoneum, spleen, liver and lungs, point of frequency in the order named. When the lungs have exhibited lesions, they were generally few and scattered and of the miliary form, while the abdominal organs showed more extensive lesions of diffuse character. I have seen the structure of one kidney entirely replaced by a tubercular mass.

Reports of Cases.—Case No. 2. Maltese cat, male, nine years old, owned by Mrs. S. Fordham, New York City. Up to within a few weeks this cat had been very active. It recently had suffered from frequent attacks of diarrhea, and had been treated for worms on several occasions, but no worms had ever been found on the examination of the stools. The appetite was always good. Thirst was excessive, and polyuria had been present for a number of weeks. The condition of flesh at the time of first examination was good, except for the muscles of the head and face, which showed emaciation.

The skin lacked tone, and the hair was dull and dusty in appearance. On auscultation of the lungs nothing abnormal was detected.

The temperature, pulse, and respirations were normal. The mucous membranes of the eyes were pallid and yellowish stained, and the eyeballs sunken, and they had a very dull expression. The abdominal walls were flaccid, and palpation showed the right kidney enlarged, rough and nodular. The lymphatic nodes appeared enlarged.

After an interval of several weeks, during which time the animal had received symptomatic treatment, the evidences of severe illness were so marked that the animal was destroyed.

Post Mortem Examination. The carcass was greatly emaciated. The lungs showed numerous miliary tubercles. The pleura in several areas showed fibrinous exudates. The heart apparently normal. The thoracic lymphatics enlarged and edematous, but no areas of softening. The liver showed few miliary tubercles; also the spleen. The kidneys showed large tubercular masses; the right kidney two large masses ⅝″ x 1″ on the cortex, also other cheesy tubercles throughout the structure. The mesenteric lymph glands were much enlarged and edematous,but no caseous degeneration on gross examination. The stomach and intestines were extremely anemic but no gross evidences of tuberculosis.

CASE NO. 3: Maltese Cat, male, age about nine years, owned by Mrs. S. Tremont, New York City, who sought professional advice on account of abscesses developing in the muscles of the neck, just anterior to the scapular—humeral articulation. The cat had been anemic for months, but during the past few weeks had been emaciating rather rapidly. Appetite at times very good, but the thirst had been abnormal for a long time. The cat, on examination, showed the facial expression, which I have learned to recognize as "tubercular expression". This is the peculiar emaciated character of the muscles of the head and face, the sunken eyeballs, pale mucous membranes, and the dull stupid expression of the eyes. In addition to the abscess, which had opened and was discharging a thick cheesy material, the superficial lymphatics were found greatly enlarged. The right kidney was enlarged, nodular and painful on palpation. Advised chloroform, owner consenting after diagnosis of tuberculosis.

Postmortem Examination: The carcass showed extreme emaciation. Lymphatics enlarged, some showing caseous degeneration. The lungs showed a few scattered tubercles of small size, bronchial lymphatics enlarged and with cheesy degeneration and pus.

The pericardial sac contained increased amount of serum, heart muscle anemic, soft and flabby. The mesenteric lymphatics were greatly enlarged and showed evidences of softening. The spleen showed several reddish-white tubercles. The liver showed numerous small tubercles. Both kidneys showed extensive tubercular areas, the right one practically replaced by a tubercular mass.

The stomach was anemic and catarrhal. The small and large intestines were apparently normal.

CASE NO. 5: Black and White Cat, male, several years old, owned by Miss R. a school teacher of New York City, who found this very friendly and intelligent animal on her door step one evening. He took kindly to his new home, and his cleanly habits indicated that he had been somebody's close companion.

The animal, while not emaciated, was rather thin, but the abundance of good food and care, did not improve the physical condition to any extent. After several months, the animal began to emaciate and lose its spirit. A veterinarian was consulted and prescribed tonics, which for a time seemed to improve the animal's condition. Some weeks later, I saw the animal, and the following condition was noted: The cat showed great emaciation of the

muscles of the head, face and pectoral region. The eyes were sunken, the membranes extremely pale, yellowish stained.

The cat had had a distinct cough, for the past two weeks, this cough being more pronounced when he would first go out-of-doors.

The thyroid gland was enlarged. The abdominal muscles flaccid, and on palpation the liver and spleen were found enlarged, and distinctly irregular or roughened. Diagnosed tuberculosis, and advised chloroform. After three days, the owner consented to the animal's destruction, but in the interval had consulted another veterinarian who had apparently confirmed my diagnosis.

Post Mortem Examination: Carcass greatly emaciated with total loss of subcutaneous fat, the tissue yellowish stained in appearance. The bronchial lymphatics very large and areas of focal necroses present. The lungs showed many tubercles of various sizes, some of them active. The liver was congested and enlarged. No tubercles were seen. The spleen was enlarged, congested and showed seven tubercles about the size of a pea. The kidneys showed numerous tubercles, all of them cheesy in consistency. The abdominal lymphatics were apparently normal, as were the stomach and intestines.

TUBERCULOSIS IN WILD CARNIVORES. Tuberculosis is not a rare disease among the larger carnivora, such as the lion, tiger, leopard, puma, or the smaller South American wild cats, when subjected to close confinement in menageries or traveling circuses. In these animals the disease generally assumes the lymphatic form, although I have seen cases of pure pulmonary tuberculosis in which cavities in the lungs were found, which resembled the typical cavitations so frequently observed in the human lungs.

The great difficulty in determining when an animal first becomes tuberculous makes it practically impossible to prevent the possiblity of infection to its companions. Particularly, is this danger greatest when animals are kept for exhibition purposes, and when it is necessary to confine several in a single cage. While it is quite safe to say that hardly any wild animal possesses an absolute immunity from tuberculosis, yet certain species and individuals are undoubtedly less susceptible than others.

The following case reports will indicate the character of tuberculosis as it appears in wild carnivorous animals:

CASE No. 1: A hybrid Lion-Tiger, male, 7 years old, a cross between a male tiger and a lioness, owned by the Hagenbeck

Show. This animal was a trained performer and was exhibited with eighteen other lions, tigers and leopards throughout the larger cities of the United States during 1903. When the show reached New York, I was consulted about the animal's condition and learned that he had been failing in condition for several weeks. The keeper believed he had caught cold several weeks before and that he had pneumonia. He was so ill and weak for about two weeks that he was unable to go on with his performance. About ten days before I saw the animal, the keeper stated that it had a hemorrhage, which, he thought, came from the stomach, but had shown some improvement during the past week.

Owing to the great value of the animal, and fearing the danger of losing it if allowed to continue to travel in its present condition, the owner, Mr. Hagenbeck, requested of the Zoological Society, permission to move it to the Zoological Park, where it might be properly cared for, and at the same time be placed on exhibition.

The request was granted and the animal exhibited in an isolated cage of the Lion House, where I had it under observation for several weeks. Under these surroundings the animal showed some improvement for a time. Gradually, however, emaciation took place, accompanied by extreme anemia and occasional diarrhea. There were frequent attacks of coughing, followed by discharges of mucus, containing blood, and occasionally slight hemorrhage from the lungs or nostrils. While I could not auscultate the lungs, there was every evidence of extensive lung affection, doubtless tubercular in character. At this time. the animal being no longer fit for exhibition, he was removed to the hospital room, where there is an abundance of sunlight and fresh air. He continued to fail and finally died.

The post mortem examination showed extensive pulmonary and lymphatic tuberculosis. The lungs, in addition to the typical miliary and larger necrotic tubercles, showed numerous large and small tubercular cavities, several of these as large as two or three inches in diameter. The spleen and liver also showed a few miliary tubercles.

Cases Nos. 3 and 4: During the year 1913, the Zoological Society received as gifts two unusually large and fine adult African Leopards. As usual with all newly acquired carnivores, they were placed in quarantine in the hospital room of the Lion House for observation, and to guard against the possible introduction of distemper into our collections.

After three weeks, one of the animals did not seem to be in good health, and the period of quarantine was extended. This particular animal continued to fail and finally died after exhibiting pulmonary involvement.

The post mortem examination showed that while the animal was well nourished, the lungs, liver and abdominal lymphatics presented extensive and advanced generalized tuberculosis. The second animal, after an interval of two months became ill, showing lung complications and hemorrhages on several occasions and finally died. The post mortem examination showed generalized tuberculosis with lesions similar to those of the first leopard. In these two cases, neither animal was ever placed on exhibition. These two cases showed the value of our quarantine system, and thus, well supported my contention that the average case of tuberculosis is contracted before the animal reaches the park, either under the unfavorable conditions found in quarters of animal dealers, or under the still more unhygienic surroundings prevailing in transit. It may be of interest to know that since 1902 tubercular diseases have played a very unimportant part in our death-rate. This is due: 1—The careful selection of animals purchased. 2—The hygienic buildings in which they are quartered. 3—The rigorous exclusion of all animals known or suspected to be tubercular, from the cages of the uninfected. 4—At the first signs of the disease in any of the animals, separating them from the healthy, washing the cages and thoroughly disinfecting after the removal of such animals, and before healthy ones are placed in these departments.

When we consider the high percentage of tubercular diseases prevalent among domestic ruminants throughout the country, we have good reason to feel proud of our record of so few cases of tuberculosis among our animals generally.

Case No. 5: This animal, a very valuable adult male, Siberian Tiger, during the fall of 1915 first showed signs of illness and was promptly isolated. Notwithstanding a splendid appetite, he continued to lose flesh. The first suspicion I had of tubercular infection was a harsh moist cough, and a profuse hemorrhage from the lungs. The hemorrhages occurred at intervals of a few days. The animal finally died.

The post mortem examination showed acute pulmonary tuberculosis with cheesy deposits in the lungs, bronchial and mediastinal lymphatic glands. The mesenteric glands also showed involve-

ment and the small intestine exhibited ulcerated patches. This animal's cage mate while looked upon as suspicious and consequently isolated, has not, up to this date, shown any evidences of infection.

CASE No. 6: A binturrong or "bear cat" (Arctictis binturrong) which had been in the collection but a few weeks died after a week's illness, and on autopsy showed extensive pulmonary and lymphatic tuberculosis.

Treatment: The treatment of tuberculosis in the domestic dog and cat is useless, and when a diagnosis has positively been made, humane destruction is the only thing to be advised. A tuberculous dog or cat, on account of the generally close association with its owner is a very dangerous animal to have about the home, especially if there are young children in the family. Occasionally you will find clients, who will refuse to have their animal destroyed, and are willing to assume all risk and danger from infection and insist upon medical treatment, hoping that you are mistaken in your diagnosis. Since tuberculosis in the dog and cat generally assumes a chronic course, the symptomatic treatment with tonics such as strychnine, arsenic and nuclein, with a liberal and nutritious diet, these cases nearly always produce a decided improvement in the animal's condition. The client then feels sure you were mistaken in your diagnosis. This improved condition stimulates false hope for the animal's ultimate recovery.

After an interval of a few weeks or months, however, acute symptoms appear, and the owner is now willing to have the animal put to sleep.

In wild carnivores the symptoms are more acute, and prompt isolation or destruction is the only thing to be recommended, followed by thorough disinfection of cage and quarters.

CONCLUSIONS. Although the diagnosis of tuberculosis is often suggested by a suspicion of an infection, this of itself is not sufficient to justify the positive diagnosis of tuberculosis in carnivorous animals. Great importance should be attributed to any enlargement of the lymphatic glands. While this enlargement may occur as an independent affection, it is usually found to be an indication of tuberculosis of some other abdominal organs.

The history of cases of tuberculosis in dogs is most important. You will generally learn that the animal has had pneumonia or chronic bronchitis. The respirations have been rapid and labored

for a considerable time, and the breathing does not improve to any great extent, while the animal is at rest. The owners cannot understand why the animals do not improve in condition in view of the fact that special attention has been paid to the diet, and considering the amount of nutritious food consumed.

In the later stages of the disease, when emaciation is present, palpation of the abdominal organs is a simple matter, and will generally lead to the detection of the tubercular lesions on the liver, spleen or other organs.

Tuberculin has been used to some extent for diagnosis of this disease in dogs, but my experience with this agent has not been satisfactory, but rather confusing. This may be due to the tuberculin. Douville's conclusion upon the result of tuberculin as a diagnostic agent may be summarized as follows: after the subcutaneous injection 8/10 to 1½ c.c. of tuberculin, the dose depending on the size of the dog, you may get a reaction from the 5th to the 8th hour. If, after the injection the temperature should rise to 104°F. or above, the reaction should be considered positive.

The injection of tuberculin in dogs fails in about forty per cent of cases. Sometimes it is dangerous since it may intoxicate, or be followed by death.

In cats, tuberculin is uncertain, or may be dangerous for animals free from the disease.

Except in two instances, I have never met with tuberculosis in large kennels of dogs, where autopsies are a matter of routine. In both these instances the dogs were show animals, and frequently exhibited in Dog Shows in numerous cities in the East, and were thus more frequently exposed to infection.

The disease is more often seen in adult or aged dogs and cats, than young ones.

Tuberculosis among carnivorous animals, especially the domestic dog and cat, is more frequently seen in cities than in country districts, and I believe this to be due to the fact, that city animals are more confined, and the opportunity for infection of the disease from human sources is so much greater. It is the consensus of opinion of those who have made careful study of tuberculosis of the dog, that the source of infection is nearly always of human origin.

Post Mortem Examination of animals that have died from the effects of the disease is the safest, and usually the easiest meth-

od of determining the tuberculous nature of existing lesions; but even in such cases a microscopic and bacterial cultural examination are almost indispensable to enable us to differentiate, with certainty, between tuberculosis and other morbid conditions, which occasionally show a remarkable similarity. I am thinking principally of lymphatic sarcoma. The determination of true tubercle bacilli in a tissue or secretion absolutely determines the diagnosis of tuberculosis.

In all instances recorded in this paper, such examinations have been made whenever the disease has been found in a new species, and in all doubtful cases.

SUPPURATING AND SCHIRROUS CORD*

C. A. Cary, Auburn, Ala.

The parts involved in suppurating and schirrous cords may be the stump of the spermatic cord, the tunica vaginalis, the cremaster muscle, the skin, fascia and sometimes the branches of the external pudic vein and artery and abdominal vein and artery and sometimes the walls and openings of the inguinal canal. Occasionally the pathological changes may extend into the abdomen and involve the peritoneum and other structures.

The causes are somewhat variable and may be mixed. Irritation of the cut end of the cord is designated by many as the most common cause. This is said to be a common sequel of clamp castrations. The clamps irritate and hold the cord down until it becomes attached by inflammatory adhesion to the lips of the castration wound and then infection follows as a more or less constant sequel. It is, however, possible to have healing occur with the cord attached to the skin and fascia without having a suppurating cord or a schirrous cord. Hence, it would appear that infection is an essential causal factor. It seems plausible that infection is the primary or chief cause of a majority of suppurating and fibro-suppurating cords. Cord ligatures are often followed by infection and fibrous development of the cord regardless of the length of the cord. This occurs in cases where the ligature is not absorbed or the

*Read before the State Veterinary Medical Association of North Carolina, June 27, 1917, at Charlotte, N. C.

end of the cord does not slough off as it should do and thus permit the ligature to pass out of the wound before it heals. I have seen cases where the castration would be healed and the silk ligature remained on the cord without showing subsequent suppuration or fibrous formation on the cord. This again points to infection as a chief if not a primary cause.

I have observed that suppurating and fibrous cords are quite common sequels of castration in horses and mules when blood clots are left in the scrotal sac or in the inguinal canal. The clot may supply food for pus germs or it may become organized into thrombus-like material and eventually become organized and fibrous. This may explain why so many fibrous or suppurating cords followed castrations when the old ecraseurs and emasculators were used and they so frequently failed to stop the hemorrhage from the spermatic artery. I am inclined to place infection as the chief or main cause and all others secondary or less in frequency and in effect. A long cord may be more easily infected and irritated. A blood clot favors infection and if not expelled may lead to a fibrous growth. Dr. R. C. Moore reports two cases where fibrous and varicosed cords were found by him in the abdomen and he attributed the cause to irritation.

A suppurating cord may be differentiated from a fibrous cord or a fibro-suppurating cord. A suppurating cord is one that periodically or constantly forms and discharges pus for more or less long or intermittent periods after the time when an ordinary or average castration wound should heal. I have known some cases of suppurating cords to discharge pus more or less continuously for one to three years. I have also known other cases to periodically form abscesses, erupt or be opened, the cavity heal and leave an enlarged cord and in three, six or twelve months another abscess appear, erupt or be opened and heal as in the previous instance. In one case repeated periodic abcesses appeared until I removed the fibrous and infected cord.

There are cases where there may be found a rather large quantity of rather dense fibrous tissue and here and there small pus centres. There are also cases where little or no pus centres can be found and the enlarged cord is almost entirely fibrous.

It may be well to note a few predisposing conditions or cases. Some horses are predisposed to excessive fibrous growths from all kinds of wound healing. Such cases are systematically or consti-

tutionally predisposed to the formation of fibrous cords. Other cases are prone or very susceptible to abscess formation and hence suppurating cords are more readily produced in them by infection. The following kinds of infection are reported by various observers: (a) Micrococcus pyogenes; (b) Micrococcus ascoformans (Botryomyces); (c) Streptococcus pyogenes; (d) Bacillus coli; (e) Actinomyces.

Some observers state that the large coccus (botryomyces) in some way stimulates the production, growth or proliferation of fibrous tissue and that when it is present as the infective cause fibrous tissue predominates in the enlarged cord. This, however, has not been my experience. The ordinary pus germ (*Micrococcus pyogenes*) is the most common infection of all varieties of enlarged cords following castration of horses and mules. In no case have I found actinomyces and only a few cases of (b), (c) and (d).

Symptoms and Diagnosis: As a rule most authors do not think it possible to differentiate a case until some three to six months after castration, yet it is sometimes possible to find a fairly well developed fibrous cord in four weeks after castration. This is especially true in pigs or hogs. Another peculiarity about enlarged cords in hogs is that they are very vascular and not infrequently sarcomas. The enlarged cord may be determined by grasping the scrotum between the thumb and fingers and then feel up along the cord toward the external inguinal ring. The enlarged cord may extend up into the inguinal canal and in rare instances into the abdomen. The enlarged cord may be largest down next to the scrotal skin or it may be spindle shaped and large in the middle and in rare instances it may be largest above in or near the inguinal canal.

If the cord is infected and suppurating there will be a fistulous opening near or in the castration cicatrix. This is the inferior termination of the fistulous tract that extends from the deeply seated pus cavity, in the enlarged cord, to the surface. This may be an old tract and it is usually surrounded by connective tissue. This has led many to believe that it is the stump of the cord attached to the skin. Hence, the old idea that a fibrous cord is always caused by a long, irritated cord attached to the skin wound. Constant or periodic discharge of pus may be seen on or over the hind limbs. Sometimes there is an odor but never is the odor as characteristic as in necrosis of bone or of teeth. Some authors have

stated that enlarged cords produce edematous enlargements of the hind limbs; but I have never observed this in a single instance in horses and mules. Others state that weight traction on the cord reflexly produces stringhalt and other reflex nervous symptoms. I have not observed such symptoms. However, large abscesses or very large fibrous cords will produce more or less impediment—lameness in the hind limb. As a rule an abscess or tumor along the cord does not press on the large blood or lymph vessels of the hind limbs. In some cases there may be some edema of the sheath and abdomen. This is, however, very uncommon.

Treatment: Prevent it by taking off as much of the cord as possible in castration and by checking the hemorrhage with a good emasculator or ecraseur and by preventing or avoiding infection. Small enlarged cords may sometimes be sloughed out with caustics or removed with a curette. Primary suppurating cords may sometimes be completely relieved by careful opening and disinfection; yet most of these cases are prone to recur unless the enlarged and infected cord is completely removed.

Operation: The instruments required are scalpel, artery forceps, vulsellum forceps, silk thread and needles, and sterile gauze or bandage for packing. The horse is prepared by withholding all feed for one or two days (not by purges) and during this time cleanse and disinfect the scrotum and hind limbs. An hour before the operation the horse is given 8 to 12 drams of chloral hydrate in capsule or in solution through a stomach tube (not per mouth as a drench). The horse may be confined upon an operating table or cast and placed on his back as in ordinary castrations. The hind legs pulled apart or spread and the scrotal and inguinal region cleansed and disinfected. I prefer soap and sterile water and cotton for cleansing and then use iodine solution for disinfecting. Cut so as to take away as much of the skin as will remove the old scar. The opening should be 4 to 5 inches long. Cut down through the fascia or fibrous adhesions around the base of the enlarged cord. Grasp with the vulsellum forceps and with the left hand (or an assistant) produce strong or heavy traction on the enlarged cord. Use the fingers to determine the limits of the enlarged cord and cut close to the cord. When possible tear the attachments of the cord away with your fingers. The pulling on the cord will pull it out between the branches of the external pudic and abdominal veins and arteries and when you tear, and cut close to the cord

so pulled out, no large vessels will be cut or torn unless they are included or pass through the enlargement. If large vessels are cut or torn, ligate them; but this is seldom done or required. After cutting and tearing away the attachments from the enlarged part of the cord, the normal cord will be found free in or near the canal. Pull the cord out as far as safely possible and sever with an emasculator if possible or with an ecraseur. If hemorrhage demands it, pack the cavity with sterile gauze bandage and close the wound with continuous sutures. Remove the sutures and packing in 12 to 24 hours and treat the wound by washing and daily disinfecting only the external parts. Handle otherwise as an ordinary case of castration.

THE TREATMENT OF TETANUS*

N. S. Mayo, M. S., D. V. S., The Abbott Laboratories, Chicago, Ill.

Tetanus is due to the *Bacillus tetani*, sometimes called the bacillus of Nicolaier, because it was discovered by that scientist in 1884 and isolated in pure culture by Kitasato in 1889. Tetanus is a pure toxemia. The bacilli of tetanus may exist indefinitely in the tissues and no symptoms will be exhibited unless toxins are formed. If the toxins alone are injected into the body the characteristic symptoms of tetanus will be produced though no germs of the disease are present.

There are two poisons developed by the *Bacillus tetani* belonging to the ptomain group, tetanin, and tetano toxin; both were discovered by Brieger in cultures of the *B. tetani*.

The *B. tetani* exists in soil that is infiltrated with animal excrement and is therefore more common in the older settled regions and in warm climates.

Ashurst and Johns report that in twenty-three cases of tetanus treated in the Episcopal Hospital of Philadelphia in ten cases the wound was infected by country earth or street dust, two by floor splinters, five by rusty nails or spikes, three due to machinery accidents and one each to gunshot wound, puerperal infection and explosion.

*Read before the Illinois State Veterinary Medical Association, National Stock Yards, Ill., Jan. 18 and 19, 1917.

When the *B. tetani* gains entrance to the animal body, usually through a wound and develops, toxins are formed that ascend the nerves by way of the axis cylinder and possibly through the peri- and endoneurium to the spinal cord. Some of the toxins also enter the general circulation.

The *B. tetani* is an anerobic organism, a small punctured wound preventing access of air is therefore particularly favorable to the development of the organism.

Unfortunately there are very few recent veterinary statistics available from which satisfactory conclusions can be drawn as to the results obtained in treating tetanus. As a rule only those cases that recover are reported in the veterinary journals, so we must rely largely upon statistics from the field of human surgery. The great war now being fought in the older settled regions of Europe and in the trenches where the soil is contaminated with human and animal excrement has supplied most of the data that I shall freely quote.

Treatment of Tetanus in England. The most satisfactory exposition of the treatment is contained in a little booklet, Memorandum on the Treatment of Injuries in War, Based on Experience of the Present Campaign, July 1915, published by the Royal Army Medical Corps. It is given in full, as it seems to be the best single comment on the methods available. It will be noted that the administration of tetanus antitoxin, and particularly the intraspinal method, is the method of choice.

"Tetanus. The heavily manured soil of the districts in which fighting has occurred frequently contains the spores of tetanus bacilli; these, in many wounds, are driven deep into the tissues and may find there the anaerobic conditions suitable for their development. Should the bacilli establish themselves in such a wound they give rise to toxins which have a great affinity for nervous tissues and produce the well-known symptoms of the disease.

"Prevention. A. General Measures. The steps advocated in other parts of this pamphlet for the cleaning, dressing and drainage of freshly received wounds, as well as for their appropriate surgical treatment, with a view to minimizing the risks of sepsis, are those which, if fully carried out, will also minimize the risk of tetanus. They need not, therefore, be further described here.

"B. Special Measures. These resolve themselves into the prophylactic use of tetanus antitoxin, a proceeding of well-established value.

"Prophylactic Use of Tetanus Antitoxin. Since in the first two months of the war more cases of tetanus occurred than had been anticipated, either by ourselves or our allies, it was decided to direct that a preventive dose of serum should be given to every wounded man in place of leaving this, as had been done at first, to the discretion of the medical officer. The results have been excellent, and, in the last six months, there have only been 36 cases of the disease among those who received a preventive dose of serum within twenty-four hours of being wounded. That this is not due to the possible absence of the cause of infection from the soil is clear from the following facts: (1) Bacteriological examination of the wounds has often proved the presence of tetanus bacilli, although no tetanic symptoms have followed. (2) Many instances of slight trismus, or of localized tetanic spasms of a muscle or a group of muscles, have been reported, without the subsequent development of generalized tetanus. (3) Thirty-four cases of severe tetanus have been reported in this period among the very small fraction of wounded men who, for one reason or another, had not received a preventive dose of the serum within twenty-four hours.

"The general use of preventive inoculation of the serum has also had an effect on the severity of the symptoms if, in spite of the preventive dose, the disease should subsequently develop. For example, of the 34 cases mentioned above, which did not have a preventive dose within twenty-four hours, 32 died, a case mortality of 94.1 per cent.; whereas of the 36 cases which occurred among the enormously larger class of wounded who had received a preventive dose, 28 died, a case mortality of 77.7 per cent.

"Influence of the Duration of the Incubation Period on the Severity of the Attack. The general experience has been, as was to be expected, that the shorter the interval between the receipt of the wound and the appearance of the symptoms the smaller the chance of recovery. At the same time, cases have recovered in which the symptoms appeared six days after the wound, and cases have proved fatal where nineteen days had elapsed. The average incubation period of 43 fatal cases was 8.83 days, and that of 26 cases which recovered 11.57 days.

"TREATMENT WHEN THE DISEASE IS ESTABLISHED. A careful study has been made of 179 cases in which certain particulars which had been called for were furnished. Of these 179 cases, 140 have died, a case mortality of 78.2 per cent. Although this figure is dis-

appointingly high, it must not be forgotten that the majority of these cases were also suffering from severe forms of sepsis, and in a considerable number of them the reporting officer stated that the tetanic symptoms had completely subsided under treatment, the patient dying from septicemia, gangrene, secondary hemorrhage, or other causes.

"A. Local and Surgical Measures. Steps should be taken to open up and clean the wound, if this has not already been done, and the freest possible drainage should be secured. The local application of strong antiseptics, swabbing with pure carbolic acid, the free use of hydrogen peroxide, and similar measures, have been tried, but appear to have had little influence on the course of the disease. Surgical interference of a grave nature, such as amputation of a limb, has been carried out in a number of instances; but such cases have almost always died, though not necessarily from the severity of the tetanic symptoms.

"B. General Measures. The patient should be kept in a perfectly quiet and darkened room, maintained, as far as possible, at an equable temperature. The avoidance of all external stimuli, likely to start a spasm is to be aimed at, and some have advocated the bandaging of the eyes, the plugging of the ears with wool, the placing of the feet of the bed on rubber disks, etc., with this object in view. It is of great importance to maintain the strength of the patient by means of adequate fluid nourishment, given in small quantities at frequent intervals, and by the rectum if swallowing tends to induce spasm.

"C. Use of Anesthetics and Sedatives. As regards the former, chloroform is most commonly used, though ether has been preferred by some, especially when required for a small operation or for the dressing of a painful wound. Their value is well recognized. As sedatives, chloral hydrate, potassium bromide, and morphin are most frequently used for the purpose of controlling spasm, the first named being the most valuable. They are of undoubted value in this direction, but do not appear to modify the course of the disease to any great extent. Too frequent or too large doses may do harm. Chloretone, in doses of 30 to 40 grains in olive oil, given by the rectum, has been well spoken of for the same purpose of controlling spasms.

"D. Carbolic Acid Method. This has been given a trial in a considerable number of cases, usually in combination with tetanus antitoxin, but the results have been disappointing.

"E. Magnesium Sulphate. It has been used in this war chiefly by the intrathecal method, but, like carbolic acid, has not proved reliable.

"F. Tetanus Antitoxin. This is the only treatment as to the employment of which there has been anything like general agreement. It has been used in one form or another in almost every case, and when cure has resulted it has commonly been given the credit. Whatever method be employed it is clear that three general principles must be observed to obtain the best results: (1) It must be employed at the earliest moment possible; a dose of 1000 to 1500 units given at a time when there is little more than a fear that tetanus may develop, may influence the course of the disease favorably. (2) It must be given in large doses, and these should be frequently repeated until the symptoms show definite signs of amelioration. (3) It must be kept up, although in smaller and less frequent doses, well into convalescence, in order to obviate the tendency to relapse.

"The most favorable results appear to have been obtained by the employment, in the first instance, of the intrathecal combined with the intravenous methods, the subcutaneous method being used to reinforce the others in the succeeding days or to replace them as the symptoms diminish in intensity.

Sir David Bruce gives the following summary of the cases treated, in the English Home Military Hospitals, Lancet, August 4th, 1914 to July 31st, 1915—231 cases mortality 57.7. August 1st, 1915 to July 31st, 1916—195 cases; 99 recovered, 96 died, 49.2%—77 of these cases had received prophylactic doses of tetanus antitoxin, 33 died, 42.8%.

If symptoms appeared within ten days of receiving the wound, the mortality was 81.5%. If between 11th and 25th, the mortality was 52.2%. Fifty-five cases, 26 to 330 days, 27.2%.

More cases developed on the eleventh day after injury than on any other although the period of incubation varied from four to 330 days.

In fifteen cases tetanus followed operations. In three cases symptoms appeared in twenty-four hours and one within two days. No prophylactic dose of tetanus antitoxin was given. The mortality was 40%.

"On Operative Interference after Tetanus Symptoms Have Appeared. There is a great deal of difference of opinion as to

whether a wound should be actively interfered with after the onset of the symptoms. It seems under the circumstances to be the most natural and rational to open out and clean up the wound and thus get at the cause; on the other hand the tetanus toxin may be leaking very slowly into the nerves and the operation may open up a large new absorbent surface. On this account there are many surgeons who deprecate interference with washing out the wound as thoroughly as possible and waiting until the tetanic symptoms subside before resorting to more heroic measures.

On the whole the evidence seems to be in favor of waiting until the tetanus has been got under control, and the blood and tissues are flooded with antitoxin before undertaking any drastic interference with the wound."

"Among the 195 reported there were only 21 cases operated upon. The mortality among these was 47.6%. No definite conclusions can be drawn from these."

Sir David Bruce says that there appears to be no particular advantage in the intrathecal method of injection. Out of the total 195 cases the number treated with antitoxic serum after the onset of the symptoms was 175. Twenty cases did not receive antitoxic serum in England. Of these six recovered and 14 died; mortality 70%. Of the 175 cases treated with serum, 92 recovered, mortality 47.4%.

"All evidence goes to show that antitoxin is the more effective the earlier in the disease it is given. This is proven in diphtheria and it is also probably true for tetanus. In order to give the antitoxin a chance, therefore early treatment should be striven for and if this were done and the antitoxin applied thoroughly one would not despair of reducing the mortality to say 20% instead of 50% at which it stands for the past year.

During the year twenty-two cases were treated by injections of carbolic acid; mortality 68%. Eighteen cases were treated, the mortality was 78%. He says there is no evidence that any benefit accrued to the cases treated by carbolic acid or magnesium sulphate injections".

The recommendations made as to treatment are: Place the patient in a quiet darkened room under the care of a capable sympathetic nurse. "Rest, sleep and food" are the first essentials. Large doses of tetanus antitoxin of high potency should be injected as soon as possible. "The patient should receive sedatives

of which morphine, grs. ¼, every four hours is perhaps the most suitable".

These suggestions correspond with our own experience in the treatment of tetanus in animals.

The treatment of tetanus in animals naturally resolves itself as follows: 1st. To prevent the development of the disease.

The prophylaxis consists in administering tetanus antitoxin 500 to 1500 units depending on the size of the horse and the length of time that has elapsed after the wound has been infected. For an average horse and a fresh wound 500 units is sufficient. After 48 hours 1000 units should be given and four days following the wound 1500 units should be given. While tetanus antitoxin is not an absolute preventive of tetanus it is practically efficient and should always be given in suspicious wounds or the owner advised as to its value and cost and the responsibility placed with him. The wound should also be promptly treated as described later. It must be remembered that tetanus antitoxin does not affect the toxin that is already locked in the nerve cell. Its only function is to neutralize any further toxin that is formed and thus inhibit the progress of the disease. For this reason it is advisable to inject the antitoxin directly into the circulation.

We should advise giving 5,000 to 10,000 units of tetanus antitoxin intravenously just as quickly as the disease is diagnosed. The animal should be placed in a comfortable, quiet, dark box stall. If it can swallow, give laxative food, particularly gruels with milk and raw eggs. Even when the jaws are partially set the animal will often take considerable nourishment if the receptacle is placed conveniently. Always give the wound good drainage and give free access to air. The wound should be washed out with hydrogen dioxide and packed lightly with an efficient antiseptic. We would advise Chlorazene, Dakin's new antiseptic, as it is a powerful oxidizing agent. A 1% solution should be used on gauze, packing the cavity lightly and moistening the gauze every two or three hours. Do not use caustics or too strong antiseptics on the wound. As a sedative, lobeline sulphate is probably the most satisfactory. It can be administered in 1/10 to 1/5 grs, every twelve hours or every six hours as conditions warrant. This allays the excitement and stimulates excretions. Chloral hydrate can be given per rectum. Do not try to dose the animal per orem. Mor-

phine should be avoided on account of its exciting effect on many horses.

One of the problems in treating tetanus is the quantity of antitoxin to be given and the frequency of the dose. The experimental evidence is that tetanus antitoxin is all eliminated from the system in eight to ten days. It remains in a practically undiminished amount for about seven days and rapidly disappears in one to two days. It is generally considered that tetanus antitoxin is more efficient as a curative agent in horses than in man. This is attributed to the fact that the antitoxin is an homologous horse serum, and also to the better technique of administration in horses.

After the preliminary injection of a large curative dose of tetanus antitoxin only additional small doses are needed, say 500 or 1,000 units every other day for a week. By the end of the first week one can generally prognosticate the case, and if it seems advisable another large dose of antitoxin can be administered.

Personally I do not favor the use of slings except in unusual cases or where the animal is of such a disposition that they can be used to advantage. In a majority of cases they aggravate the horse, in some cases, however, slings are indispensable.

This then is the rational treatment of tetanus based upon our present knowledge:

1st. Give a large dose, 5,000 to 10,000 units of tetanus antitoxin as quickly as possible. Time is very important. Treat the wound with oxidizing antiseptics, give drainage and allow the access of air. Use sedatives, particularly lobeline sulphate. Good nursing, that shall furnish food and water with the most complete rest and quiet are very important factors. With this treatment we should expect more than 50% of recoveries.

It is also important that a convalescent animal should be given plenty of time for a complete recovery. The reconstruction of the nerve cells takes place slowly.

—Dr. R. M. Graham of the University of Kentucky at Lexington, has been appointed Professor of Animal Pathology in the College of Agriculture and Chief of Animal Pathology in the Experiment Station of the University of Illinois, Urbana. He is a graduate of the Iowa State College and is well known for the work he has done on forage poisoning.

TICK ERADICATION*

E. I. SMITH, Baton Rouge, La.

The work of tick eradication in Louisiana commenced as far back as 1906, and was financed by the state,, through the aid of an appropriation in favor of the State Crop Pest Commission; it being decided at that time that cattle were a "crop" and ticks were a "pest".

As a result of this start, not much was accomplished, for the time appeared to be too early to inaugurate a campaign of "greasing" the cattle all over the state. Two parishes, at that time, commenced operations: namely, Lincoln and Claiborne. Lincoln dropped out the next year on account of so much opposition being developed by her people. Claiborne continued and worked without furnishing any cooperation along the lines of inspectors, until 1912. In this connection, the U. S. Bureau of Animal Industry and the State of Louisiana furnished all of the assistance. Of course, it shifted the responsibility from the citizens to a small army of men who were not in a position to do anything more than strongly urge and timidly resort to the courts. As a result of such conditions, a few ticks were left in Claiborne, and they have continued to spread and allowed to go uncontrolled. Therefore, the first of last March, that parish was placed under State and Federal quarantine.

In 1913, 1914 and 1915, the parishes of Madison, Tensas and East Carroll were released accordingly, which, at the present time, constitutes the entire amount of released area in the State of Louisiana.

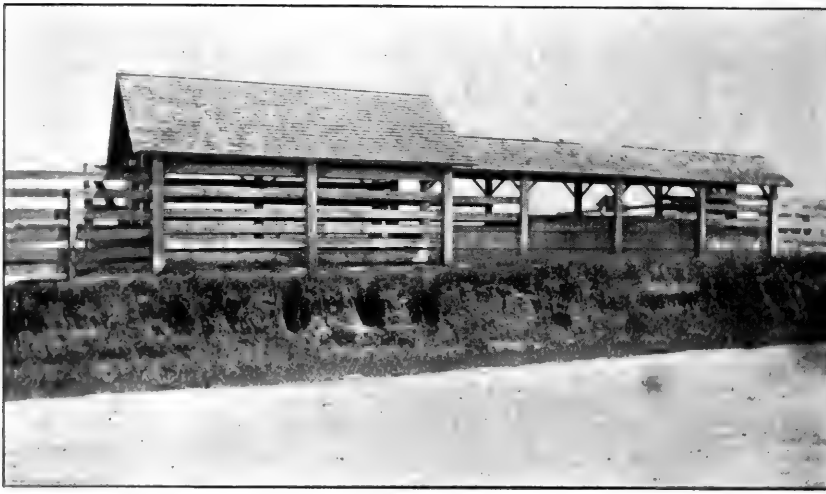
Last year, in 1916, eight parishes worked systematically in the State, dipping their cattle every 21 days, but, as a result of such long periods of dippings, none of these parishes were able to be released from quarantine. This year, we are working 20 parishes, and the new ones are dipping their cattle every 14 days, and it is estimated, through the cooperation we are now receiving in the State, all of these 20 parishes will be released from quarantine this coming fall, providing they continue to cooperate throughout the season.

In the Spring of 1916, the State Legislature unanimously

*Summary of remarks made before the members of the Cut-Over Land Conference of the South, New Orleans, Louisiana, April 11, 12, 13, 1917.

passed a State-wide tick eradication law to become effective in 1918. Only a few weeks previous to such action, the State of Mississippi passed such a resolution, and, as a result of these State-wide resolutions being passed to eliminate the dreaded cattle tick, Arkansas and Texas have followed suit, which means that an ultimatum has been signed whereby the tick must go.

At the present time, in travelling over the State of Louisiana, there seems to be united opinion that when 1918 arrives every parish will be ready and willing to commence an active campaign against the tick. In this connection, the Louisiana State Live Stock Sanitary Board had declared its intention to work every parish



1. A Model Dipping Vat on the grounds of the Louisiana State University.

next year, providing the Bureau of Animal Industry can assist, and, so far as I am able to state, we believe they can. When the State is ready and wants to do the work, we believe that to be the opportune time to organize the forces accordingly.

Already, considerable money has been spent in Louisiana for the eradication of the cattle tick; that is, from 1907 to 1915, the State spent \$43,000; parishes, \$100,000; and the Bureau of Animal Industry, \$93,000, and from April 1, 1916 to December 31, 1916, the State spent \$10,000; the parishes, \$47,000; and the Bureau of Animal Industry, \$30,000.

Last year, our records show 1,516,081 dippings in the State of

Louisiana under the supervision of inspectors, and that was all under the 21 day system.

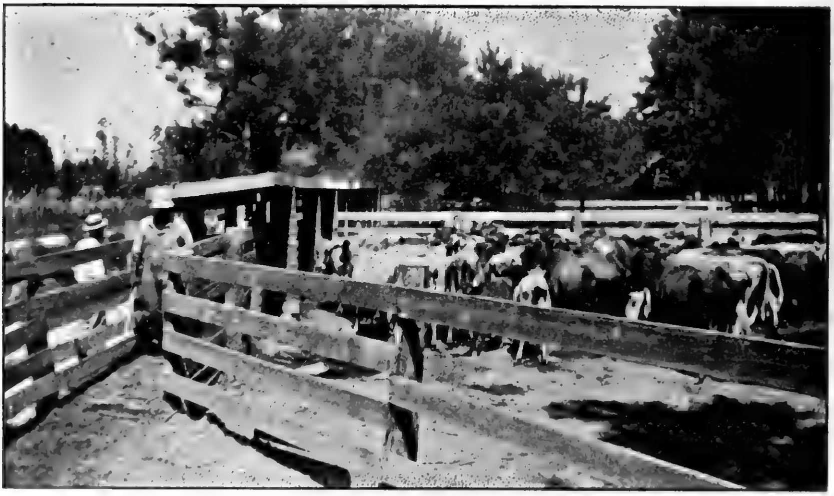
During the year of 1916, our office at Baton Rouge sent out to various citizens in Louisiana something like 65,000 pieces of literature pertaining to the eradication of the cattle tick, and, so far, we have received a large number of replies, which indicate that the communications were kindly received. This Summer and Fall, as the time will permit, it is our intention to send out double that amount, which will go to parishes which contemplate doing systematic work next year.

This season, there will be in operation about 1200 dipping vats in the parishes doing systematic work, and from 20 to 25 tons of arsenic will be required to charge such vats. In each one of these parishes, there is located a government-trained veterinary inspector who has complete supervision over the work in the parish, in co-operation with the State Live Stock Sanitary Board and the Police Jurors. In this connection, the parishes furnish from four to ten local inspectors—men chosen for their integrity, ability to handle other men, and devotion to the work. After a few weeks' service, these local inspectors become very expert, as a result of being trained, and their work carefully supervised from day to day. Each inspector is furnished with a chemical testing outfit, and he is shown how to determine the quantity of arsenic in each vat, so that it will not either become too weak or too strong, which, in either instance, would be useless.

In 1906, the U. S. Government commenced an educational campaign throughout the Southern States in co-operation with the state officials along the lines of tick eradication. In those days the dipping vats were not heard of and the only method available for the destruction of the cattle tick was to gather the cattle in a pen and make an effort to grease them with some preparation of black oil or any other greasy substance. This was accomplished by a swab on the end of a stick and you can imagine the difficulties one would meet in undertaking to grease 1,500,000 cattle, as our records show were dipped in 1916, in one season. At that time, when this first move was started, the people throughout the South were skeptical and did not believe that we would be able to complete the eradication of such an insignificant pest as the cattle tick. Therefore, their question was, "Can it be done"? This brought back a reverse answer, from the average class, very emphatically,

"No"; but things are changed materially today, and the question that now confronts the people is that they are asking the government and state when they can have their co-operation to assist them in cleaning up the cattle tick. The experimental period has passed and now, as over 300,000 square miles have been cleaned up and released, the people are aware of the fact that the project has gone far into the practical stage, and the demand for the work throughout the southern area is causing larger appropriations every year from the Bureau, State and local officials.

This year, the State of Mississippi is planning to clean up every county, so that cattle from now on may have a clean bill of



2. Dipping Cattle.

health wherever they may move intra or interstate. There is not a Southern State that has cattle ticks within its border which is not working strenuously to completely eradicate them, and it is estimated that this year's work will be successful in cleaning up about 100,000 more square miles.

Congress is appropriating, at this time, between \$600,000 and \$700,000 to help such areas that desire to help themselves.

Since the work of tick eradication started, the States of Kentucky, Tennessee, Missouri and California have gone completely above the quarantine line, and, the way conditions now appear,

it would be safe in saying at the close of this year the States of South Carolina and Mississippi will also be placed above the line.

A considerable amount of money has been spent on tick eradication in the Southern States since the start, but, when one stops to consider the great number of cattle in the area and the increase in valuation from dipping alone, the original figures spent for the eradication of the cattle tick will sink into insignificance when brought into comparison. Farmers in Mississippi, Alabama and Tennessee had the privilege of expressing their opinion as to how much the valuation of their cattle was increased after dipping, and their average replies were between $7.00 and $10.00 per head.

3. Dipping Vat in Pine Woods of Louisiana.

The cost of dipping in any parish or county, according to our figures, run from 23c to 50c per head, and, even if a parish has to spend on an average of $1.00 per head to eradicate the ticks, it is an investment that should not be debatable.

This year, we have been handicapped somewhat on account of the lack of State funds to meet the demands of the work in Louisiana. When the legislature wisely passed the new State-wide Act, they failed to make sufficient appropriations for the complete carrying out of such a law. There are now a number of parishes already working which are not receiving State aid. They were advised, in the Spring, as to the condition of the State's finances and

some of them proceeded, in spite of such lack of funds, to furnish the entire co-operation. It is not right for the State to help some parishes and not help others, but, under the present appropriation, it becomes absolutely necessary. We have one parish in this State, which, during the last 45 days, has built over 50 vats, and, so far, the State has been unable to assist them. With the interest already in view, and the number of parishes that are being called on to work next year, it is imperative that the State have more money to assist along this line, as the time to do tick eradication is when the people are ready, and we have every reason to believe that every parish in Louisiana will lend their undivided efforts in 1918 to the complete eradication of the cattle tick. State funds will be necessary in order to meet every little demand in the way of inspectors and incidental expenses. The State should have a general travelling inspector to assist in the supervision of the work and whenever some miscreant dynamites a vat the State should have sufficient funds to offer a reward for his capture and conviction.

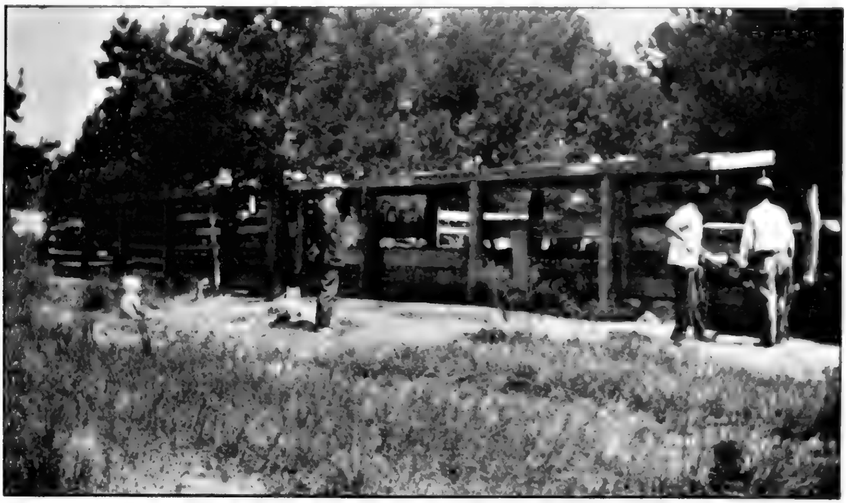
Mississippi will clean up her territory this year, and. next year we hope to have the advantage of a trained force from that State to supervise the work in Louisiana. We now have twenty-six men on the federal force of this State and they are thoroughly trained along the line of tick eradication.

It is evident that the Bureau will have enough men, parishes will be ready, and the only drawback will be the lack of State funds, and if the people of Louisiana wanted the advantage of such assistance, they should put the matter squarely before the finance committee of the State Legislature and demand that such appropriation be liberally increased.

At the present time, there appears to be a great desire on the part of Louisianians to purchase a better grade of cattle, which, of course, originates in the tick free areas. However, in spite of the fact that such cattle die after being infested with the cattle tick. the enthusiasm on the part of the buyers is still increasing. Louisiana is recognized as a State which can grow all kinds of grasses and yield any class of food suitable for cattle. Therefore. as tick eradication progresses and the lands become cleared from timber, the sentiment in favor of increasing the number of cattle in the State grows accordingly. I know of 6,000 head of cattle which will leave the State within the next 30 days for Texas, where they

will graze this season and later be finished for the market. This is a condition which should be changed, for in various parts of this State one can ride for miles and miles over cut-over timber lands that are growing an abundant amount of grass and apparently going to waste for the want of cattle to graze upon it. If these 6,000 head of cattle could be distributed over Washington, Tangipahoa, St. Helena and Livingston parishes, it would certainly mean the commencement of a rejuvenation.

The interest in this State is now very keen, and, so far as we are able to observe, the only drawback this year has been for the want of funds by the various parishes. If there could be some organization formed whereby those parishes could be loaned a fair sum of money at a reasonable rate of interest, it is believed, as a result, we would be working a considerably greater number at the present time than we are already cooperating with.



4. Dipping Cattle.

The great area of cut-over timber land at present is a perplexing problem. It is land that is lying idle, growing back to shrubbery and weeds, and, in a number of cases, that I have had an opportunity to observe, the only use that is made of it is to stock it with goats. If capital will permit, it is believed that if the timber interests will buy up large numbers of cattle, placing them in charge of a competent herdsman, and graze them on the cut-over lands, that there will

be almost no end to their revenue and advertising they will receive accordingly. Of course, feed must be raised in the Summer to support the cattle in the Winter, but if it can be done by a few individuals in the case of 5,000 or 6,000 cattle, it is believed it could be done by the lumber interests with a much larger number to feed.

The cattle industry has come to stay and statistics indicate that for the next quarter of a century to come they will hold their own in price or materially advance. When anyone travels over these great areas of timber lands, he cannot help being impressed with the beautiful lay of the land. It is rolling, well watered, and located in a climate which offers every advantage a man could desire. Nature provides everything—even food, raiment and shelter—which are the three great assets of mankind.

—The National Association of Bureau of Animal Industry Employees has, by a referendum vote among its branches, decided not to hold its annual convention this year.

—The semi-annual meeting of the Genesee Valley Veterinary Medical Association was held at Albion, N. Y., July 25. Papers were read by Dr. J. L. Wilder, of Akron, Dr. Dodd of Canandaigua, Dr. McClelland of Buffalo, and Dr. Cleaver of Avon. Operations were also performed upon eight patients at the clinic.

—The deaths of a number of farm animals have been reported at Porterville, Calif. Veterinarians, who made post mortems, declare the animals were poisoned. One rancher reported the loss of eight mules valued at $2,000.

—Newspapers report that Dr. W. Horace Hoskins recommends the conscription of horses in the large cities to prevent the shipping to Europe of "green" mounts fresh from the West, on the ground that the city horses, as a rule, are seasoned and noise-broke and less liable to certain diseases than the "green" horses.

—A Woman's Auxiliary of the Philadelphia branch of the American Red Star Animal Relief has been organized to help raise funds for a veterinary hospital in that city.

—Dr. Gustave A. Kay of the Bureau of Animal Industry has been transferred from Omaha, Neb., to Shelby, Iowa.

ITEMS IN RECENT HISTORY OF VETERINARY MEDICINE

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(*Continued from page 674*)

BLACKLEG, EMPHYSEMATOUS ANTHRAX, BLACKQUARTER. This like the genuine *anthrax* is remarkable in that the germ, once introduced into wet, undrained, and dense, impermeable soils tends to maintain itself there for a great length of time or permanently. The microbe (bacillus of blackleg), 3 to 10 microns long, is distinguished from the bacterium of anthrax by its rounded ends, the microbe of anthrax having square or cupshaped ends, by the frequency of a spore in one end (making it clubshaped) or in the middle, by its unreadiness to live in circulating blood where oxygen abounds, by its avidity for certain acids notably lactic, so that its abundant haem-albuminoid exudate gives off a distinctly sour odor, and a gas that accumulating under the skin makes the part crackle when handled, it further differs from *B. anthracis* in not finding a congenial home in carnivora and omnivora (cat, dog, pig, bird and man).

The tendency of these two germs to survive in dense, damp, or rich soils, places them in a class with *Bacillus tetani*, and other such microbes, having dangers all their own, and requiring a prophylaxis peculiar to themselves. Neither of them possesses the contagiousness which places it in the list of pestilences spreading by mere proximity of stock, but each has its own special danger, arising from its localization in soil, and the difficulty of dislodging it after it has once secured a soil habitat. A common plague can be stamped out with its victims, and, after disinfection the seat of the outbreak may be perfectly wholesome for others, but these enzoötics with an earth-habitat have come for a prolonged stay and, when permitted to interfere with the uses of the land may become even more destructive or ruinous because more continuous. We can render such land sanitary by expensive underdraining, aerating, and a sufficient delay before using it again for stock, but this takes time and the loss of crop after crop, in addition to the heavy outlay, may reach up to the entire cost of the land or more. In this, too, the chief offender is not necessar-

ily some lordly taxgatherer who exacts his ever growing dues, that he may lay in store the earnings of his skillful and industrious people and spend a lifetime in making and hoarding new engines of destruction, and in training his yearly increasing conscripts and launching them at the opportune moment on his unsuspecting and unprepared enemy, to grinding him under his august heel, and establishing his dynasty as world ruler. On the contrary, the offender in this case is but a plain, respectable dealer, not himself a breeder nor improver of live stock, but a mere pedler, who exacts his tax on every transaction, and by natural habit of thought ignores the harm that his actions impose on the community. He can buy cheaply from infected lands, can turn his purchases along with others, the more the better, on wet, dense-soiled growthy pastures; he can afford to lose some at times but goes on complacently hiring a new clean pasture and proceeds to infect it in the same way. His business is to turn over his stock to a purchaser at a good profit, and he can't be expected to keep them, while in his hands, in a place he knows to be infected, risking at once his own property and the interest of his prospective customer. Thus he goes on uninterruptedly spreading a deadly infection over pasture after pasture in the dense, wet clay or overmanured rich soils, where it will last indefinitely. In the past people took with what complacency they could command the inevitable stock plagues that followed in the wake of every great war waged on the European Continent. In this peaceful and favored nation, however, we must follow with critical eyes the actions of the accommodating dealer who holds in his hands the means of desirable improvements in our, as yet imperfect, herds, to see whether he is really contributing to the improvement or the destruction of our live stock and their pasture lands. As pasture after pasture becomes infected, we have to see that our own stock and meadows do not suffer from the water-shed from infected pastures lying above ours on the same slope, that the creek does not bring down to us in our water supply, the deadly germs stored up on the slope above us, that dust storms do not carry the germs onto our land and that the buzzards, and other scavenger birds and vermin, do not drop their infected prey where it will do the most harm. Even breeders of improved races of stock have to be watched with equal care. With the high prices paid for their yearly increase they can afford to pay for the *immunization* of their whole

herd including those that they offer for sale. They suffer no losses in their own herds so we are encouraged to buy in confidence, but discover later that this trust was misplaced, when we find that not only has our nonimmunized stock suffered but that our pastures, which have hitherto justified our confidence in their purity from plague-infection, have become suddenly and in a sense permanently seeded with an intractable and deadly plague. We can of course follow in the footsteps of the seller and ourselves immunize our herds, but in doing so we have loaded ourselves with a new obligation for expenditure, which cuts our profits, and worse than all we have made ourselves a new and active spoke in the wheel, which promises to carry the infection farther and farther as years go on.

To deal fairly with the question of *immunization* we must note one by one the various recognized methods of accomplishing this:—

1st. There is the old method of *inoculating a drop or two of the active virus in the dense tissues at the tip of the tail* (after the fashion of inoculation for lung plague). This simply produces a localized blackquarter, in a cold season, in a dense tissue with limited circulation and no loose connective tissue in which the abundant morbid exudate can take place, so that the germs can undergo but a limited encrease, and meanwhile the leucocytes are busy, producing defensive materials which soon bring the pathogenic germs to a standstill. If, in exceptional cases, under the action of *bruising, antipyrin, acetanilid, potash, alcohol, common salt, proteus vulgaris,* or *Micrococcus prodigiosus,* or *other sedative* or *irritant,* the swelling extends unduly the tail can be cut off, well above the seat of inoculation, and the stump treated with an antiseptic bandage. So far as the animal operated on is concerned this is effective, but when employed in a place previously free from blackleg, it furnishes a most promising prospect for the planting of the deadly germ in such land as a permanent pathogenic crop. It should therefore be strictly confined to land already infected, and the live stock kept on such fields, with the further proviso that such stock must not be moved to other land nor premises for a length of time, and that no drainage can take place from this newly infected land to any other. Further this land must now be treated like other blackleg territory and abandoned for raising food or litter for cattle and sheep.

Second. Thomas (Verdun) cultivates the germ in the body of a frog, dips sterilized threads in the exudate and inserts them, sub-

cutem, near the tip of the tail. The same precautions must be used as when the virus is used in the same situation, direct from the exudate in cattle. The open wound and the risk of other (pus) germs favor a freer discharge and a readier planting of the germ in receptive soil. It contaminates the soil. There is also more danger of introduction of other bacteria with fatal effects.

Third. *Arloing's method.* The affected tissue from the newly killed victim is cut out with carefully sterilized instruments and hands, dried, powdered, mixed with sterile water to form a thick paste, and enclosed in an incubator at boiling temperature for seven hours. In the absence of spores this ought to be sterile and equivalent to a mixture of bacilli and defensive materials. It is given in a dose of 1½ grain mixed with 15 drops of sterilized water injected subcutem generally in the tip of the tail. A second preparation made at the same time from the same material, is subjected, in an incubator, to a temperature of 90°F. for 7 hours. This is not given subcutem until 10 days after the first dose. The second dose cannot be trusted to be perfectly sterile. It rarely harms the partially immune animal operated on, but if spores are present these may escape death and seed and infect the land. Like other methods this protects the herd operated on, but cannot be counted on to protect the soil. Unfortunately even experimenters have usually drawn their conclusions from the question of efficiency or inefficiency on the herd operated on, and not the protection of the soil and of vulnerable animals which may thereafter be turned on such soil. For animals on already infected soil, and to be left on such soil thereafter, it works well. But, in case of its infecting soil previously clean, it may become a means of spreading the infection to other soils and animals.

Fourth. *Kitt's Method* is virtually a counterpart of Arloing's, but without the first, *sterile,* injection. It is open to the same objections. In regard to both, if the system of the animal is already charged with agents rendering it more vulnerable (*lactic acid, sarco-lactic acid, potash, common salt, alcohol, antipyrin, Proteus vulgaris* or *Micrococcus prodigiosus,* or toxins of either of the last two) the inoculation may prove fatal. Both carry the danger of infecting new soil or of reinfecting or doubly infecting the old. So that both should be avoided (if they may be) where the locality is still uninfected.

Fifth. The Bureau of Animal Industry followed Kitt in using but a single nonlethal (not necessarily noninfecting) injection. The lesion from a blackleg case, is taken with due precautions pounded in a mortar, to form a homogeneous semiliquid mass. This is spread in a thin layer in a glass dish and subjected in a thermostat to 95° to 99°C. for six hours. The resulting thin scale must be again mixed with water for injection. It will be noted that this heat is insufficient to kill the spores (110°C.) so that we are again dealing with an infecting product endangering both a susceptible subject and the soil. It has, however, *"proved exceedingly helpful in preventing disease"*. It has, however, proved unsatisfactory so that a still newer product is now promised, but as its actual nature has not yet been revealed it is still impossible to pass judgment on it.

Sixth. *Intravenous and intratracheal injections* of virulent serum from the acute blackleg lesions have been resorted to on the ground that the abundance of oxygen in the blood and bronchia would check proliferation of the anaerobic germ and produce a safe prophylaxis, but the dangers attending the injection are so great and the escape of the germ from the air passages to infect the soil is so uncertain that neither has secured the acceptance of the profession and the public.

Seventh. *Roux* sought to escape the dangers of a living (even if attenuated) germ by passing the serum from a blackleg lesion through a Berkfeld filter and using the sterile filtrate only, for inoculation, but the confessedly great dangers from accidental infection has prevented its general adoption.

Eighth. *Kitt* secured immunization by inoculating once only with dried virus which had been subjected for six hours to live steam (colorless) at 100°+ C. This has the merit of avoiding the diffusion of live spores on noninfected land, but it has failed to secure general acceptance.

Ninth. In different outbreaks, since 1880, I have taken the blood from the sick live animal, or one just dead, and heated it for over an hour in a water-bath at 100°C., then broken up the coagulated mass in well boiled water, filtered the material, through a sterilized cotton cloth, and used the filtrate for inoculation in a dose of 2 drams, repeated, on the second day. Great care is taken in maintaining the boiling temperature for the full hour: then inflaming the upper part of the container to clear anything adherent,

that may possibly have escaped the full action of the heat; to see that hands, instruments, and all articles used have been thoroughly sterilized; and to dip the hypodermic nozzle in strong carbolic acid each time just before inserting it.

It is not asserted that this method is infallible, but it has served me well, and I feel certain that it will do equally well with any one who will be as careful. It uses the endotoxins prevailing in that particular herd, together with what defensive agents have been formed, and thereby escapes all the possible evils of a mistake in diagnosis. It almost infallibly escapes any spores of special vitality and resistance, as spores are rarely found in the blood during life, and are not likely to harm the subject inoculated. The temperature has been amply sufficient to kill all living bacilli, so that their is no danger of their escape to infect new soil through feces or urine carried to it. This last provision is further and more effectually taken care of by the fact that the method is only carried out in a herd and on land *already infected* and with this particular brand of the germ, so that its adaptability to it is well assured, and all possibility of error excluded.

It carries out what I have been particularly pleading for: the use of the identical germ acting in the disease before us, with its toxins and the defensive materials adapted to it, and not to some other pathogenic germ; it makes use of no living blackleg germ, and cannot add therefore to germs or spores that may be already present in the bodies of the inoculated, or in the soil or premises where they are kept.

The inoculated are of course under order not to be taken from the premises or pasture. There is always the possibility that some contain germs in their systems or on their surface, or, as stated under *foot and mouth disease,* in *nonvascular, necrotic, fibroid, calcified,* or *degenerated structures,* in *foreign bodies* or *organisms, living* or *dead,* and these may escape to contaminate *susceptible subjects, soils* or *places,* but at least, *all such dangers were present before inoculation and cannot be charged upon that operation.*

Again it must be allowed that this inoculation does not exclude the possible presence of *lactic acid* and the other agents named as increasing the vulnerability and inviting deaths that might otherwise be escaped. Such agents are accidentally present before the inoculation, and are in no sense dependent on the operation. The keeping of the herd on the premises should at least rather counter-

act all unnecessary exertion, and thus obviate the formation of the powerful, vulnerant *sarco-lactic acid.*

It must be further allowed that the strongest resistance (immunity) is usually to be derived from a casual infection with the disease itself if that proves to be nonfatal, and that the *measure of potency* in resistance is not to be expected when the injected materials are confined to the dead germ, its toxins, and the defensive matter found in the blood, as in the case we are now considering. By this restriction to the products of the germ and the defensive body cells not only is the potency of the defense lessened, but the duration of the *immunity shortened* so that this form of *immunity* is usually designated *passive* instead of *active* or *persistent.*

But even with this qualification is it not well worth while to substitute this more transient immunization for the other even if that is more persistent? We secure a protection, variable in duration, but always enough to protect against immediate illness and death, we escape all the deaths that occur from the direct, operative introduction of the virus, and we escape all dangers of the extension of that virus to other susceptible animals and to lands and premises that were previously uninfected, we escape therefore all possible extension through our inoculation and its consequences. Look for a moment at the contrast. A herdsman or breeder has been long at work to build up the herd of his ideal, and that his business demands. Among other things he has sedulously kept clear of blackleg. But suddenly through purchase, or some other unsuspected channel, the germ finds its way into his herd and one animal dies of unquestionable blackleg. His veterinarian (probably a government inspector) makes a *post-mortem* examination, diagnoses blackleg, and proceeds at once to inoculate the whole herd, using the active virus as well as the defensive agents and thereby *saves the herd.* But the pasture is a heavy clay, at places wet or even marshy, and like a good farmer, he has not spared fertilizers, including that from his herd of inoculated cows. All goes well for a time, and he congratulates himself that he has got over the trouble. But as the young calves are weaned, go out on the pastures and grow there, first one, then another, and another die of blackleg, then if at all versed in the subject, he begins to suspect that the hope of immunity is unfounded and that the plague has got planted *for good,* or rather for *ill,* in his pastures. What must he do? Inoculate all his young stock with the too well founded expectation that from this

time on he must go through the same taxation, anxiety and possible loss, yearly, for an indefinite period? Sell out his farm and home, then, if he can, secure another at a price commensurate with his means, and start anew with much loss and no little tear, wear, and anxiety? Tear up his pastures, underdrain them thoroughly and wait for years until they have become porous, aerated and clear of the living germ, his stock meanwhile being kept on sound hired meadows until time and immunity shall assure him that he need no longer fear blackleg on these drained acres? In any such case, has he a right in law or equity to compensation for the planting of blackleg on his farm and for all his attendant *avoidable* outlay?

I will doubtless be told that the respectable and universally trusted laboratories are careful enough to see that no immunizing agent sold is capable of planting such a deadly germ on a *germ-free* farm. On the contrary, my careful study of the subject has failed to find a single preparation in regular use against blackleg that is free from the active virus, capable of planting blackleg in any receptive soil. With the great number of serum laboratories now in the market all commercialized and in strenuous competition with each other, can we hope that all will hold themselves so far above mercenary motives as to make all their products above suspicion? In glancing over their advertisements, I find that they mostly hold out that their products are of the "highest potency", "highly potent", "guaranteed of high potency" and the like, but few care to tell in what this alleged potency consists. *The most potent in immunizing* being usually those that introduce the active living virus, it is reasonable to assume that in this their potency consists, but this is precisely what we have reason to dread as a means of planting blackleg in new fields, and opening more of the national estate to its sway. Then if they fall back on the national license as guaranteeing their freedom from anything objectionable or harmful, we have only to quote the B. A. I. as authority that the foot and mouth disease epizootics of 1902 and 1908 started in the products of such laboratories, and nothing is more notorious than that the same infection was widely spread in 1915 by anti-hog-cholera products of these laboratories. It is manifestly impossible for the federal government to oversee and control the now numerous biological laboratories so that the license can be looked upon as little more than a permission to sell freely what they can produce. Results have shown only too clearly that the license cannot be taken as guaranteeing the safety and harmlessness of the product.

In the case of the malady now before us (*blackleg*), its control and restriction must be sought in a much more comprehensive supervision. Through its meat inspection and the inspection of markets and stockyards the government may trace out most of soil infected areas in the land, make an accurate census of the cattle and sheep on such places, and put the owners under bond to sell no such animals without permit and without a public registration of the sale and purchaser, and for what purpose the sale was made. If for slaughter, that should be under government inspection and report. No sale should be made to a pedler, but only to butcher, breeder, feeder, or dairyman, who will be obliged to hold the stock for one month under federal registration and supervision, and the purchaser must be notified that they come from a *blackleg* source so that he may not turn them on clean land to contaminate it. Such purchasers, like the original owners, must be placed under bond not to sell these cattle except at the end of the quarantine, and the holder of the animal, be he original owner or purchaser, must be held responsible for any such animal as may disappear from his herd. In some such way it may be possible to keep control of all cattle and sheep on blackleg land, until it can be thoroughly dried and rendered germ-free and wholesome. To this end the government (federal or state) could advance money for drainage under mortgage on the land, and the germ could be gradually hedged in and exterminated as a public benefaction. Such an outlay of public funds would be in the nature of a paying investment which would pay a liberal return in the future, an altogether better employment of the funds than in munitions of war and the slaughter of the trenches, the submarines and the dirigibles, and not to be compared in any way with our *pork barrel* outlay for impossible ports and alleged navigable rivers, (but *really for the benefit sub rosa of the congressman and his friends.*)

ANTHRAX. The genuine *anthrax* becomes localized and *enzootic* in the same class of soils as does *blackleg*, but it has a very much wider range of victims, including all domestic animals, many wild animals, and even man himself, so that its invasion of damp, dense, wet, and rich soils is less easily controlled and its ravages much more extended. Being actively aerobic, the bacterium, 4—even 20 microns long, by 1 micron broad, sporulates readily when exposed to warm air, and, as the spore is more resistant to disinfectants and other destructive agents than that of blackleg, it is much more likely to sur-

vive out of the body for a great length of time. Rivers, like the Delaware below Trenton, which receive the waste water of large tanneries, using foreign and domestic anthrax-hides, become heavily charged with the spores, and the bottom lands, frequently overflowed, become so saturated with the germs that domestic animals cannot live there, without immunization. The same is common of smaller tanneries situated farther inland and the tanners have habitually paid for the animals that died. The disease is often spread by animal products imported from abroad (hair, bristles, wool, horns, sinews, etc.) Imported food stuffs are a common origin, and it may be difficult to trace these after they have been eaten, and when attention has been drawn to the sudden deaths of the animals fed. The dry hides being so light are often packed above food materials and infect the latter while at sea. However introduced, the germs are largely spread by insects, as well those that are predatory on animals as those that prey on the food.

If seen in life, the victim is usually found apart from the herd, standing with depressed head, stupor, or if moved, staggering, temperature 106°–107°F., mucosa bloodshot, may be oozing blood, feces blood-stained or streaked, may show colic, or bloody urine.

If found dead (the usual case) oozing blood in the nose, around the anus, the extreme dark color of the blood generally (it brightens little or not at all in the air), the presence of dark bloody engorgement, in mucosæ, or of dark blood on their surface, the presence of petechiæ or blood exudations in or on different tissues, an enlarged blood-gorged spleen, and anywhere the presence of bloody and gelatinoid exudations (subcutem, in connective tissue, in or between the muscles, subserous, etc.) If the germs are *inhaled,* the lesions tend to predominate in the pharynx, trachea, bronchia, pleurae and pericardium and lymph glands (wool sorters' disease); if *swallowed,* in the tongue, pharynx, throat, and intestines, (anthrax of tongue, pharyngeal, guttural, lymph glands, anthrax of stomach and bowels); if by biting insects, local cutaneous and subcutaneous anthrax (malignant pustule, etc.)

When the dose is large and potent, and the victim very susceptible, it is liable to kill without leaving marked local lesions (fulminant anthrax), or at most a blood-gorged spleen (splenic apoplexy). Such cases are usually found amidst others more or less localized and these latter serve to characterize them.

In case of uncertainty, the blood or serous exudate from a local lesion may be examined with confidence of obtaining a conclusive result. Sir John M'Fadyean dries on a glass slide a film of the suspected blood, and stains it for ½ to 1 minute with a 1% watery solution of methylene blue and ½% of sodium bicarbonate. The slide is again dried by pressing between two sheets of bibulous paper and then waving above a Bunsen flame. Under the microscope this shows a few leucocytes and many stained anthrax bacteria. The nuclei of the leucocytes show a greenish-blue tint, while the bacteria are of a deep blue. Around and between the bacteria is an amount of reddish-purple amorphous matter which is especially characteristic of anthrax.

The complement fixation and precipitation tests have proved less satisfactory in anthrax than in other infectious diseases.

Prophylaxis and Immunization. Prevention and Immunization are the prime resorts in dealing with an infectious disease common to man and animals and the germs of which can live indefinitely in dense, wet or overmanured soil as also in water, to be roused to a destructive career whenever susceptible subjects are brought within its range. The ideal management of such an affection is to circumscribe the affection absolutely, and to exterminate the germ so that the whole country and finally domestic and wild animals in the entire globe shall be delivered from the terrible menace that it constantly holds over us. What I have said on *blackleg* is doubly applicable to *anthrax*. The locating of anthrax-lands can be determined by tracing back from extended anthrax outbreaks and inspections of live and dead, the registration and quarantine of the infected herds traced out, and the penalizing of any sale or disappearance of any animal from such herd unless it be for slaughter under inspection, or the placing in safe quarantine until the animal can be confidently pronounced safe and harmless. Disinfection of all animals, and things on the infected premises and of all removed out of them is a natural corollary. The infected pastures and lands, where possible, must be subjected to thorough underdrainage, and for this the funds may be furnished by the state or nation and a mortgage taken on the redeemed land.

It is needless to repeat here what has been said in connection with *blackleg* and the attendant slaughter and disinfection, only to enjoin more rigid and far-reaching precautions, in keeping with the far wider range of the genera subject to the infection, and the more

redoubtable results of the disease. The need for accuracy is all the greater that the *Bacillus anthracis* is ærobic and must not be exposed to the air lest it produce its lasting spores and provide for its survival and future triumphs. If the carcass and products are not at once destroyed by heat, disinfectants, or caustics, all external openings of the body must be plugged with cotton saturated with antiseptics until the more destructive agents can be put to their effective use. So with everything that has come from the *corpus delicti*, especially from its interior.

Every imported material that might by any possibility harbor and convey the infection should be strictly excluded. We can grow our animal products at home, and even if the infection were not so dangerous and destructive to man and beast as in that before us, it is a poor economy to admit from Europe, Asia and South America those products that we can produce as cheaply, and save the cost of ocean carriage, repeated handling, and often a heavy tariff besides.

When *anthrax* has been detected in a herd, and a sick animal is available, it should be made to furnish protecting serum for the as yet apparently healthy members. Blood is abstracted from the victim and boiled in a water bath,with a cover so that the temperature may be uniform throughout for at least one hour. Boiled water is added and the blood broken up, so that its soluble matter may be drawn out. It is then strained through a close (sterile) cotton cloth and the filtrate used for injection. Objection has been made that this will fail to kill the germ, but it must be noted that the blood of the living victim contains *no spores*, but only the staff-shaped bacteria, which in water are readily killed by heat. The filtrate therefore contains only the toxic products, which rouse the leucocytes to produce the defensive material, and also whatever protective material has been already elaborated in the blood of the donor. It has further been alleged that these soluble protectives are ineffective in anthrax, but this is in contradiction of all experience of the disease. Recoveries constantly occur in mild attacks, and these can only take place through the operation of these defensive cell-products in checking the active proliferation and lethal action of the bacteria. The very *serum-virus, simultaneous* treatment, which these objectors advocate, is an appeal to the therapeutic powers of these efficient protectors. The question before us is simply whether we shall deliberately add to the deadly germs that may be already in the system and thereby run into danger of a fatal result, or if

we shall altogether avoid the introduction of living germs and trust alone to the introduction of the therapeutic and curative products which cannot plant the seeds of the malady. It is true that the living *Bacteria anthracis,* multiplying in the body and producing all the local and general lesions and symptoms of the disease, provided these come short of a fatal result, establish a stronger and more enduring resistance or immunity than if the attack is of a milder, perhaps scarcely appreciable, nature. But our duty has been only half done unless we take all precaution against the propagation of the germs in the pastures, it may be at first by the removal of the stock to indoors, where the germs can be taken care of and destroyed, instead of being scattered wholesale by their deliberate introduction into new animal systems, and indirectly into new and hitherto uninfected soils. The second resort is to dry and ærate the fields by effective underdrainage, but the full effect of this cannot be secured at once, and the good effect cannot be counted on before a year or two at least, and after time has been allowed for the death of the bacteria already planted in the soil. Meanwhile our injection of the defensive products,—alexins, antitoxins, opsonins, cytolysins, bacteriolysins, and the rest, together with the toxins, etc., which rouse the leucocytes to the habit of producing a better crop of defensives, are building barriers and defensives which protect the system for the present. The objectors recognize the dangers I have referred to, inasmuch as that they forbid the use of the living virus in animals showing an abnormally elevated temperature. Such cases, being already infected, are, they admit, liable to perish from the addition made to the virus. Is it not better and every way more rational to restrict our defensive injection to the sterile products and entirely *omit the living virus?* If we were debarred from measures whereby we might sanitate the pastures, soils, and water-supply, we might be excused for adding to the virus in the animals, and infecting new fields and water supplies, with a view of making the surviving herd invulnerable (or less vulnerable) in the presence of an enemy which we are (or then would be) bound to submit quietly to; but, if we have presented to us the task of exterminating one of the worst enemies of prosperity, of humanity, of animal industry, of the health of man and beasts; if there is open to us a feasible and very promising way of effecting this extermination, must we turn from the task and devote ourselves to the work of husbanding and preserving the evil?

The *simultaneous method* is, as we have seen, but a makeshift. It is anything but a thorough, radical and permanent way of dealing with anthrax. In his recommendation of it, Dr. Eichhorn claims "very favorable results" in the many millions of animals treated by it. He, however, acknowledges that the product deteriorates very rapidly when kept under usual conditions, and that "*great losses have resulted from the application of inert vaccines*"; that "*it requires two handlings before immunization is established*"; that the "*losses from vaccination are not insignificant*"; that "*standardization is often defective*"; that "*its application in herds where the disease has already made its appearance is apt to induce the disease through the reduction of the resistance of the animal during the development of immunity*", "*and should only be adopted in herds in which the disease has not yet appeared.*" In view of these serious drawbacks and dangers, it may well be exchanged for something at once more radical and safer. But for an uninfected herd in pasture or premises free from infection, there is surely a double and more potent reason why it should be shut out. The blindness of the simultaneous-method men is a narrowness of vision. They see only the preservation of the individual animals operated on, while they are quite incapable of looking beyond to see the many pastures, premises and herds, among which they have been steadily planting the destructive disease-germs. Taking solipeds, cattle, sheep and swine, the government statistics for 1913 give a grand total of 201,639,453 head, at a total estimated value of $5,299,306,779. Though this leaves entirely out of account the smaller genera (dogs, apes, cats, goats, birds, etc.) all open to attacks of anthrax, it opens up an idea of our national interests involved, and of the future possibilities in case the existing undeniable anthrax-extension in the United States should increase to something approximating a general epizootic. Few other diseases when occurring epizootically have left as great a record of terror and human helplessness as has anthrax. In Grecian legend we have the destructive extension on the Plains of Troy when that city was besieged for ten years by the Greeks. The rich alluvion from the adjacent hills, the unhygienic camps, the arrest of beneficient cultivation, and the warm climate account sufficiently to us for the wholesale destruction of animals in general, tame and wild alike in the common death. In the plagues of Egypt again with a similar rich alluvial soil in the Nile Valley, as yet without the ameliora-

tion of dams, irrigation and artificial drainage, it was exactly fitted for an universal extension of the infection in "boils and blains upon man and beast", until it could scarcely be called a hyperbole to say that "all the cattle of Egypt died." The disease prevails along the Nile bottom-lands to the present day. A far more extended and enduring plague is that known as "The Siberian Boil Plague." Every word conveys a feeling of dread. *Siberia* the land of evil and punishment; *boil* like *blain* conjures up the *bubonic plague* of man and animals, long the terror of East and West; and *plague* conveying more than any of its synonyms the idea of crime and resultant penalty and suffering. Wherever the same conditions have concurred, we have seen, and up to today see, the same results. And to return to our own land in the wet lands of the Lower Mississippi and in the Gulf States to the east we find a steady progress of anthrax as the cattle industry expands and may I not add, as preventive measures favor the further dissemination of the germ.

As direct evidence of this dissemination I cannot do better than introduce some facts from Dr. Eichhorn's article of a year ago, on the experiments made at the Bethesda, Maryland Station.

Six cattle and five sheep were subjected to the *simultaneous* treatment by *anthrax virus* and *anthrax serum*. All survived. Three weeks later, *when immunization should have been complete and effective*, (and if they failed to become immune and had been exposed in an anthrax place they should have been mostly dead) they were subjected, *sub cutem*, to specially potent anthrax blood of a guinea pig, (¼ c.c. for cattle and ⅛ c.c. for sheep), while three additional cattle and two sheep had similar doses of the same anthrax blood and were kept as checks. All the animals without exception (*supposed immune* and checks) showed a marked rise of temperature showing that the *virus had taken effect*. Then as to the final result: All of the immunized cattle recovered, excepting one undersized, unthrifty calf which died six days after inoculation. Of the *immunized sheep* four died and one recovered. Of the *checks* or *control* animals all died of anthrax in a time varying from two to eight days.

If this experiment proved anything, it proved that the *simultaneous method* did not destroy the active, virulent, anthrax germs in the system though it had had a full survival and leeway of eight days, in certain cases, in which the defensive materials

could have operated on the living virus. It showed that the immunized cattle and sheep were not resistant enough to kill the inoculated germs since all showed an elevated temperature for a time after the virulent injections. It follows then no less surely, and without any possibility of fair dispute, that for this length of time these germs could escape from these living bodies, and contaminate places hitherto free from anthrax as well as any susceptible animals put into such places. In saying this I am not contending that the *simultaneous method* does not give a measure of protection to most of the animals operated on, but that if such animals are operated on in an *anthrax-free* place, they are furnished a good opportunity of infecting such place, and extending the area of anthrax infection. And be it noted that this extension of infection, if not deliberately planned by the Bureau of Animal Industry and other sanitarians in using their methods, is none the less brought about by the official work of such persons in seeking to control the number of deaths from infected and exposed animals. Can any one escape the conclusion that such sanitarians are, even if unthinkingly, making provision for propagating anthrax and extending the area of its infection? It remains then merely a question of opportunity how long it will take for anthrax to spread over all areas where the soil is favorable to its preservation. I do not for a moment suggest that it will remain permanently settled in every place to which it is carried. On soils naturally well-drained (sand, gravel, light loam, etc.) it will tend to be restricted or even to die out.

A year ago, at our annual meeting, Dr. Wintringham expressed apprehension that this *serum-virus* inoculation would serve to plant infection in theretofore uninfected areas and Dr. Gerald sought to assure him by quoting his own (Gerald's) personal record. "This year," he said, "I have *'vaccinated'* something like 10,000 head; I vaccinated 6,000 head on the range, *where there had never been any anthrax, and on this range we lost two head out of 6,000, using a commercial vaccine.*" He did not condescend to tell the meeting whether they died from inoculation, or if they died from contracting anthrax afterward. Purposely, or unthinkingly, Dr. Gerald evaded altogether the crucial question of the *diffusion of anthrax by simultaneous inoculation.* Colorado, where he operated, is not a state in which the conditions are favorable to the diffusion of the anthrax germ and of the extension of its area.

The Plains are mostly composed of sand *with a little clay,* and the natural drainage is so good and the rainfall so scanty that no agriculture, *not even hay raising,* can be carried on without irrigation. Even irrigation is greatly restricted by the scantiness of the water supply. Had the experience quoted been on the heavy impermeable clays of Mississippi, Alabama and Louisiana, it would have meant something. Coming as it did from dry, sandy Colorado, it was not even remotely pertinent to the question in hand. Dr. Gerald, however, acknowledges two deaths after inoculation. It seems as if these had been either overdosed, or were the subjects of the concurrence of a dose of lactic acid or other material that intensifies the action of anthrax, or finally that the anthrax germ, unknown in that territory until now, had escaped from his inoculated animals, with deadly effect upon the unhappy two. It is easy to read between the lines that even rainless Colorado could not prevent the escape of the prophylactically-imported germ. Conditions were not such as could preserve it, that was all. Dr. Eichhorn himself quotes the extension of anthrax last year in Mississippi where the new agriculture is being fostered by availing of the universally available fertilizing measure, the livestock industry. Dr. E. succeeded in stopping the disease, for the time, in the infected herds—he left no animal that had not been prophylactically inoculated—no one that was capable of *contracting* the disease. The question before us is, whether on these impermeable Mississippi clays the calves, born in the succeeding spring, will not, many of them, contract the deadly anthrax from the germs left over by the animals operated on by the *serum-virus simultaneous method*, the year before, and whether on lands so naturally adapted to receive and propagate the seeds of anthrax, anthrax will not be thus started in this way and later perpetuated and spread from these centers. Cases can be adduced without limit in these Southern States, of wetness and clay, in which anthrax has been introduced to a farm and district by the arrival of new stock and thereafter continued as a permanent cause of depreciation of the value of the land through its interference with the raising and dealing in stock, or through the expensive and troublesome alternative of the inoculating of each animal yearly or even more frequently.

This underlying question is so fundamental to the prosperity of the country that we cannot exercise too much care in its consideration and management. It is not primarily a question of what

would be most immediately remunerative to our profession, nor to the great establishments which devote their energies to the production of immunizing serums, defensive products and viruses. These are but subsidiary employments and their success is not to be considered as on a level with that of the great livestock industry and the interdependent agricultural profession, the source of the food, clothing, and well-being of the world. The veterinary profession as a whole can only flourish when the livestock flourish, and whatever loads down the livestock with unnecessary and unavoidable burdens and losses must rob the veterinarians of their returns. Prevalent infections must of necessity reduce the profits of the stockman and drive him out of his business, and as livestock decreases, the veterinarian must find his vocation unprofitable and uninviting, and so with the owners of biological laboratories in their turn. Prosperity must in the end depend on the soundness of the roots of the great industrial tree—the livestock possessions of the country, and when these are depressed and fail, their natural dependents, the veterinarians and laboratory workers must first go to the wall, while all other industries of the nation must suffer and sink in their turn.

We, as a profession, stand today on trial. If we keep our eyes fixed steadily on the only worthy object, the final extermination of all infections, and the possession of an earth without a remaining wasting plague, we can hope to hold our own with the gratitude and thanks of our fellowmen, but if we as a profession lose sight of this noble ideal and advocate and practice that which will contribute in any degree to the distribution and diffusion of plague-germs we must look for increasing dissatisfaction and distrust and content ourselves to be only fit to be abandoned and left out, in the march of the future progress.

These words are especially called for when we are dealing with diseases like *blackleg* and *anthrax* which are not alone germ-diseases but in which the soil itself becomes an infected medium, in which the germ proliferates, multiplies, and spreads indefinitely as it does in living hosts. The limited view which would confine the application of its protective measures to the living infected herd, and that by inoculating it with a *weakened, attenuated virus* which would immunize the well, on sound pastures must be abandoned; the prophylactic agent may be *sterile toxins, antitoxins, opsonins,* or *defensive proteids* from some known, or as yet un-

known source, wherever you can find an agent at once effective and yet inoffensive; we must on no account use the living virus of the infecting disease which may under any possible condition, in a new living host, in congenial earth, or anywhere else have its vitality and virulence restored, and its power to arouse a world devastating pestilence renewed.

Autotherapy, literally cure of one's self, is seemingly better fitted to an assembly of hypnotists or faith curers, than to an association of veterinarians. Nevertheless, every animal and for that matter, every plant is by nature endowed, within given limits, with a power of *self cure.* From our earliest days we are having this power demonstrated in the spontaneous healing of the wounds and bruises, abrasions and incisions, by the process of scabbing or adhesion, the decoloration, solution and removal of extravasated blood or serum, and even in the repair of broken bones and ruptured tendons or ligaments, so that we become prepared to expect similar repairs in the deep-seated structures as well as in the superficial. When we entered the study of the living body we saw in the whole, a mass of microscopic living cells pervading every tissue, and constituting the active nutrient, functional, and metabolic centers of each. These cells are like so many centers of active work by which the different tissues are kept in normal form and activity, and by their sleepless activities the body as a whole is fitted to maintain a continuity of life, and of all the multifarious processes that render a healthy existence possible. One function is dependent on the healthy exercise of another which preceded it, and the beneficient outcome is equally dependent on another that must follow it, unless the whole body system is to go to wreck for lack of suitable food, from the supply of ill adapted or improperly prepared food elements, from the use of similarly unfit products for secretion; from their inadaptability to produce those myriad metabolisms which are indispensable to the vital functions of other and distant organs in the body; and, finally, for the appropriate preparation of used up materials so that the excretory organs can cast them out of the body, and free it from the accumulation of deleterious and dangerous reserves and retentions. The least defect or shortcoming in the work of any cell or group of cells, if it cannot be repaired and remedied, is a constant threat and peril to other cells interlinked with this in function. If self repair were impossible to each cell, what a mass of ruin the body must soon have become and how short the period of its survival.

When we realize that each cell, from the first, is endowed with the power of repair, not only of its own structure, but also of the tissue over which it has direct control, we have before us a splendid and practically almost illimitable field of prophylactic and therapeutic endeavor. And under the influence of such a spectacle how wide and rich the invitation to avail of these all pervading natural powers to carry on our professional duties. We can change an unhealthy and unhealing wound into a healthy and healing one by adding sound epidermic cells or a graft of deeper tissue as well; we can combat a vicious or defective metabolism, by restoring the healthy function of a distant organ on the healthy function of which the anabolism of the first was dependent, or such distant metabolic organ might be obtained from a young animal and grafted into the body of the subject having the defective function; a defective or disordered liver may be rectified by a graft of a pancreas, or a defective hypophysis by a graft of thyroid, and so with other vicarious or substitutionary glands. We can even stimulate by increasing circulation in the controlling gland, and thereby arousing to action the defective one.

We can call into play the products of the living cells, nuclein and nucleic acid to restore a failing vital activity in defective cells, and thereby secure healing or even a new vitality and service.

But what interests us even more, and should be ever present to our minds as practitioners, is the universal operation of curative action on the part of the cells in recovery from disease, and above all things, recoveries from microbian diseases. The disease has attacked its victim violently and has advanced in the same manner to a crisis, and then it abates and progresses to a more or less speedy recovery. It is quite evident that, in all such cases of recovery, the invading morbid germ has been met by a successful antagonist, and, with our knowledge of the body cells and their services in the healthy system, it is obvious that recovery must have been operated through the body cells as well. In the self-limiting contagious disease this explanation is fully borne out by the invulnerability of the recovered system under a second infection. The cells are no longer actively susceptible to, and vulnerable by, another dose of the microbe but show a strongly antagonistic attitude to the poison, and this lasts for a length of time and in many diseases for the remainder of life. It has long been obvious that this antagonism cannot be attributed to any

simple chemical product laid up in the body, as that would have been exposed to constant solution in the lymph and blood, and to removal from the system. The remedial agents and the immunizing ones must come from a continuous action of the cells which charges the circulating fluids with the resisting material, and keeps up a constant supply. If, by and by, the immunization gets worn out, it is because the cells have lost their acquired function of producing defensive materials, but this function is acquired once more when the cells are called on to again subject themselves to and contend with a new and successful attack, or are subjected to the effective toxins of the invading microbe. With an experience of this kind before us from the remote date when such diseases were first known and recognized, to the present day, who could close his eyes to the fact that it is the defensive chemical products of the disease-invaded cells that establish the immunization? This clearly apprehended, and the way is open to deal with such diseases by autotherapy, whenever the attack is such as to make the attempt admissible. Two conclusions are necessary to harmonize with facts observed. *First*: The microbe attacks the cells by its poisons (toxins, enzymes). Even in those cases in which the microbe enters the interior of the cells, it produces the toxins as before, and until the cells perish they continue to produce the antitoxins or defensive materials. *Second*: The invaded cells produce their defensive materials, in the form of antitoxins, etc.—*chemical bodies* and not living organism—bodies that cannot multiply by reproduction. In order therefore that immunization may be at all lasting, it must be by a *habit acquired by the cells*, one which once acquired is persistent for a time at least, as habits are liable to be. We have before us the only rational basis for a *safe autotherapy*. *In the first place* the living microbe can be dispensed with since the *sterilized toxins* will still, *though non-vital*, arouse the cells to elaborate the *defensive agents*. *In the second place* these defensive agents, from whatever cause produced, antagonize the microbes, or even kill them, and check or arrest their deleterious work of producing toxins. Where the autotherapeutic elements are procured from the animal suffering from the disease, the infecting liquid (blood, lymph, serum, pus or other exudate) is divested of its living microbe, by passing it through a Berkfeld filter, or by heat, or by both, and the *now sterile liquid is injected sub cutem*. This cannot produce the disease since it contains no

vital, living germ. It can be conceived that when in *great excess* it may destroy life by the potency of its toxins, but in the absence of any living, proliferating toxin making organism, it can neither start the infection in the animal injected, nor produce a self-propagating malady in other susceptible animals. In the absence of any infection the *chemical protective agents* from the cells, together with the defensive matters normally present in the blood and other liquids of the animal operated on, will far more than overbalance on the right side any killed microbes and toxins that may exist in the small amount of liquid injected. So far then as the subject operated on is concerned, the resort is usually quite safe as well as effective.

A dim prescience of the value of such a resort may have been connected with the very old adage "A hair of the dog that bit him" though this was more commonly applied to the slave of an alcoholic or other narcotic habit who in his effort to reform, and his sudden abstinence, found his suffering more than he could bear, he must have one slight indulgence more, for this last time only.

In the earliest days of bacteriology various observers, (Chauveau, Toussaint, Pasteur, etc.) undertook to produce immunity by injecting germs robbed of *part* of their potency (*attenuated*), by heat, light, or a prolonged rest in an inactive condition, or in an insusceptible or unfavorable system. This was apparently successful in many cases. The chief objection to its use is that justly made to the *serum-virus* (*simultaneous method*) that the attenuated germs, fresh from remarkable successes, in the hands of Toussaint, when tested at the Alfort Veterinary College upon what proved to be very susceptible subjects, led to a succession of fatalities. The system was at once generally condemned. Such a series of *sudden* deaths in test animals, was too severe an example. Yet what is to a large extent a counterpart, the inoculation, by Pasteur, of men and dogs, with a live virus attenuated by a prolonged resting in light and dry air, was visited with no such censure because, the *inoculated subjects survived*, and the weakened germs escaping from such *inoculated*, planted the seeds of the dread disease and maintained it year after year in France, America and other lands where Pasteur Institutions were maintained. Nor has such blame been visited on the *simultaneous method* of inoculating with *serum and virus* to *immunize* swine against hog cholera; the inoculated herd is usually saved, while the virulent seed is scattered

widely, and if where susceptible swine are found, the disease abounds later.

Roused by such warnings careful observers had a clearer vision, which penetrated the delusive surface-garb of *seeming good,* to perceive, beneath, the prolific evil of seed scattered everywhere and growing up in ever increasing pestilential harvests. It was plain to them that no plan nor system was good or safe, which preserved the seed to grow up later into an all pervading evil crop. Those endowed with this clearer vision advocated *hyperimmunized serum* or this combined with *killed bacteria,* sub cutem, in any case where the herd has been exposed to infection but not yet showing fever nor acute symptoms of the disease. Both these may be given in large doses as neither contains living germs, which can cause the disease in other susceptible animals. In case there are already sick animals in the herd, these should be at once removed, the pens thoroughly disinfected, and the patients treated with large doses of *hyperimmunized serum alone.* Should they recover they should then take the treatment with *killed bacteria* and should be kept in strict seclusion (quarantine) for one to two months. Before release they should be subjected to surface disinfection and all necrotic parts or foreign bodies (possible culture flasks or preservers of microbes) removed.

I have already quoted my use of sterilized virus, in 1880, as an immunizing agent in hog cholera. See also Law's Veterinary Medicine'', vol. IV. pp. 15-20, 214, 255, 281-3, 726, 727).

Autotherapy is most rationally and safely applied by administering, sub cutem, the virus of the sick animal, first diffused, and cultivated for twenty-four hours in a normal salt solution at ordinary room temperature, then sterilized at 212°F. passes through a Berkfeld filter, and then injected into the animal from which it was taken. This contains toxins, bacterial enzymes, and defensive matters produced in the infected body, but after sterilization no living germ,—nothing that can convey the disease to the animal operated on nor to any other,—nothing that can plant living infection in ground previously sterile. The animal operated on has the same infection and cannot well be injured by the toxins of the very few germs originally derived from its own infected body. These germs are weakened by twenty-four hours removal from their rich food in the tissue juices and blood of a susceptible animal, and by the comparatively much lower temperature of the room, than of

the living animal host. There has been also the drawback of the defensive matters contained in the virulent liquid, with some addition and modification wrought by the tissue or blood cells that were contained in the blood or exudate derived from the sick animal, which in themselves must have put a rein on the pathogenic activity of the exiled germ. The best testimony is the often almost miraculous effect that it has in cases suited to its use. Cases of long standing, intractable, by all other treatment at once take on a healthy action and close up and heal with incredible activity. So marvelous and undeniable were the results in many cases that one could deal gently with an enthusiasm that seemed to carry its advocates beyond the bounds of reason, but it was so evident that in this we had struck a lode of unusual value that the overzealous ought not to be too much hampered by opposition, until experience should show where the real limits of the new departure should be drawn.

Dr. Charles H. Duncan of the Volunteer Emergency Hospital, New York, the devoted leader of the new cult, warmly advocates the method for septic and suppurating conditions generally, his zeal not stopping short of using crude pus administered by the mouth as a dog licks his wound and secures rapid healing through limitation of bacterial growth and products, while availing of the *defensive materials* produced on the surface of the wound by the living, defensive leucocytes. He recognizes the limitation of other wound-infection bacteria by the prompt removal by the tongue, and the antivirulent operation of the products of the defensive cells on those few that remain on the sore. He quotes remarkable examples of the antivirulent action of the injected defensive products, on deep-seated pockets of purulent or septic microbes, the existence of which is a constant source of infection that operates in keeping up active disease elsewhere. He further adduces cases of poisonous proteids (ivy poisoning) not in any way dependent on infective microbes, against which a satisfactory immunity was established by feeding the ivy leaves to a milch cow, and having the ivy-poisoned patient drink her milk. From this Dr. D. argues the prophylactic value to man of the milk of cows or goats that have been fed the virus of contagious diseases. In the same manner he feeds to nursing women the infecting products of children's diseases that the antibodies in the milk may antagonize and immunize against such diseases (bronchitis, tonsilitis, sinusitis, rhinitis, pharyngitis, pneumonia, boils, abscesses, furuncles, rheumatism, appendicitis, gastro-

enteritis, etc). Prior to parturition he would place the subject on the milk of an immunized animal that she might pass through the danger period of child bearing without risk.

Veterinarians taking up the matter hopefully have been equally optimistic and claim equal measures of success. Numbers merely catch the pus in a spoon which they rub on the tongue that the animal may swallow. Obstinate and long intractable poll evils, fistulous withers, quittors and other pyogenic diseases, have undergone prompt improvement and recovered in the ratio of 100 per cent. Dr. D. J. Mangan, in charge of the Department of Street Cleaning, New York, claims that he saves in this way many horses that would otherwise have been shot as incurable. Dr. W. R. Grutzman, Veterinarian to the 15th U. S. Cavalry claims 100 per cent cures in the horses and mules having purulent infections. These might be added to at will.

The method is being adopted in all parts of the world and is most favorably reported. When carefully manipulated so as to see that sterile products only are used, it may be resorted to freely in all suitable cases.

Limitations of Autotherapy. The widely extended success of any method of treatment should not warrant its use in a reckless manner. Even self-therapy, though based on the all but universal truth of the protective power of the living body and its cells against invasions by infectious agents may easily be resorted to in such a way as to bring only failures or even fatalities. Infectious diseases which attack with great suddenness and extreme violence like *fulminant anthrax* allow no time nor opportunity for self-immunization, and inoculation of exposed stock with even the sterile toxins and antitoxins will often be attended with danger. The animal taken from the same herd and operated on, may be already infected and the addition of the phenomenally potent toxin may be the means of sealing his fate. To guard against such an accident any candidate for operation should be first carefully examined to make sure that all bodily functions are still healthily and normally active and above all that there is no elevation of temperature nor other manifestation of fever. With a hyper-acute attack of a specially deadly infection, the presumably lethal toxins should be debarred, and no product from a diseased animal administered unless the protective blood serum can be secured to be given alone.

Again no disease the germs of which can survive in the soil

of pastures, prairies and other lands, should be used even when taken from mild cases to be given in crude form to an animal from which it may escape into the receptive soil. This includes such diseases as blackleg and anthrax unless exhaustive precautions are taken to see that no live germs can possibly escape from the sterilizing chamber.

Again diseases that are not decidedly self limiting are poorly suited for auto-therapy. Glanders and tuberculosis in animals, like syphilis in man are so slow to establish immunity in even the most favorable circumstances that autotherapy could only be carried out at considerable risk. The English Cavalry and Artillery have long found it easy to keep clear of glanders by excluding all diseased purchases and shooting all that showed the disease after purchase. It would be equally easy to purify our city stables but without rigid and inflexible measures the disease is bound to prevail indefinitely. We cannot any longer assert that there is never a recovery from glanders nor tuberculosis. There are undoubtedly mild attacks of either disease which the victims outlive so as to make an ultimate recovery, but both are so liable to develop in occult forms that the preservation of the victims and above all their stabling in the same premises with other stock is sure to lead to extensions of the affection.

The manifest disposition in both the medical and veterinary professions to resort to the use of the crude (unsterilized) disease products cannot fail to bring discredit on the operators and on the system of treatment. It cannot be denied that in many cases marvelously good results have come from following this course. This is plausibly explained by Dr. J. J. Sellwood, of Sellwood and Besson, General Hospital, Portland, Oregon. "In process of filtration the infectious element of the pus is eradicated and the immunizing free toxins employed, *just as when given by the mouth the stomach digests the infectious element and sets the toxins free in the general circulation.*" "*Pus by the mouth is applicable only to those infections that are not in any way connected with the alimentary tract and respiratory system.*" We can accept Dr. Sellwood's facts based on long years of hospital experience, without adopting in full his explanation. With our everyday experience, that proteids like peptones, that are deadly when injected directly into the circulation or tissues, are harmless and nutritious after passing through the unbroken mucosa of stomach and intestine, we

can find a better and more generally applicable explanation of the harmlessness of bacteria toxins after passing through the same healthy mucosa. The toxins are free enough and poisonous enough in the infecting liquids ingested to prove fatal when given in sufficient quantity. The action of the gastric mucosa is *metabolic* rather when it robs the peptone of its deadly power, and the bacterial toxin of its dreaded potency. The toxins in their modified form are still valuable in rousing the protective body cells to produce antitoxins, opsonins and the other antagonistic materials if either cure or immunization is to be accomplished. We accept the facts showing both therapeutic and immunizing value of the virus in many cases when it has been passed through the protective epithelium of the stomach or its counterpart the epidermis of the cutis, but the very need of such a metabolism emphasizes the need of filtration or sterilization in the many cases in which these tissues cannot exercise the requisite metabolic power. The sound cuticle usually bars out the virus of such a deadly infection as anthrax or such a harmless one as cowpox, but if there is the slightest abrasion, pin prick or insect's bite the infection takes effect on the tissues of the susceptible subject. Is it then wise or permissible to introduce by the mouth a toxic, it may be a deadly virus with therapeutic or immunizing intent, when the slightest scratch by alimentary matters, the presence of a sharp or rough foreign body, a wound left by caustic, burning or freezing, an exposure of the *quick* through cryptogamic growth, bacterial invasion or otherwise, the bite of a parasite in the mouth, fauces, pharynx, gullet, stomach or intestine, or the presence of any one of many diseases will open the way for the introduction of the disease germ however deadly or comparatively harmless? So long as we have the opportunity of avoiding these manifold dangers are we not bound by every Hippocratic maxim, by our obligations to humanity, and to humanity's most valuable living possessions, to steer clear of all such uncalled for dangers as we have been portraying and to use in our sanitary work, such agents only as are assuredly sterile, and by channels, that in everyday experience open so many roads to failure, and to loss? Should we deliberately omit such obvious precautions are we to be held guiltless because we have been taught better and licensed to practice medicine and sanitation? Does not our fuller education, broader intelligence and license setting forth the trust that is reposed in

us on account of these, deepen our condemnation when we fail to make use of all known safeguards to protect the citizen and the nation from injudicious and dangerous practices introduced under the name of sanitary work?

Autotherapy has been much more availed of in connection with *surgical infections,* therefore in *purulent* and *septic* conditions, and in *slow* or *chronic* cases in which there is time and opportunity for its application. It is, however, applicable to all maladies that are followed by a period of immunity even if that should be in a measure transient. An infection may last in a more or less degenerated tissue where it would die out in normal tissue in healthy condition and with a strong vital activity, always provided the tissue and other lymph cells can elaborate a sufficiency of defensive products. It is mainly the capacity of the cells to perform this work that meets the necessity of the case, although we must never overlook the need for a power of acquired invulnerability toward the toxins, and an ability, with the aid of the opsonins to take in and digest invading bacteria themselves. All available products, and conditions that are inimical to the bacteria and their products should be availed of to hold them in check, while the formation of defensive agents are fostered. Soothing damp applications may be resorted to when there is excessive heat and tenderness. Biel's increase of blood in the part by a cord round the limb, higher up, maintained for an hour or two and then the onward movement of the blood and lymph hastened by the aid of friction, massage, Swedish movement cure, brushing, or even exercise may serve a good purpose in different cases. Antiseptics are rather spurned for fear of decomposing defensive products and rendering them useless. But simple astringents like alum, sugar of lead, tannin, and salicylic acid solution, or salicylate of soda may often be applied to the surface with good effect. Internally nuclein, nucleinic acid, and even colloid metals, glycerophosphates, and even sulphocarbolates may do good.

The common pyogenic bacteria (micrococci, staphylococci, streptococci, colon bacteria, in their wide variations, the septic bacteria and bacilli of the different shades, bacilli like those of tetanus, septicemia, malignant edema, foot rot, streptothrix, actinomycosis, Johne's disease, caseous lymph glands in sheep, goat, calf, guinea pig and rabbit, the tuberculoid disease of rabbits, hares, guinea pigs, rabbits and birds, ulcerous lymphangitis

of horse, ox, and guinea pigs, spirrilli, spirochaete, etc.) live largely in soil, where they decompose organic matter and prepare food for plants. In this respect they should be classed with those of blackleg and anthrax, but they differ in their wider extension and the greater difficulty attendant on their extermination. The tendency naturally is to accept them as an irremovable burden or tax that we must continue to bear for all future time and which we can mitigate only when an individual animal is attacked, and by means that come under either treatment or immunization. A certain number of diseases coming from this class of germs have no lasting immunity after a first attack so that we are thrown back on curative treatment alone with such transient immunity as comes from autotherapy and the defensive materials that can be produced by the protective body cells. There is this advantage in dealing with these pyogenic and septic bacteria derived from the soil and surroundings that many of the diseases caused by them come directly from the germs from outside the animal body, and comparatively rarely extend from animal to animal so as to cause a spreading plague. It is therefore the more difficult on the one hand to deal with them through our ordinary measures of plague-prevention, and in a sense relatively more can be accomplished by therapeutics than if they spread rapidly and inevitably from animal to animal. They stand somewhere between the con tagious pestilential maladies, and disorders caused by such everyday causes as faulty food, feeding, exposure, overwork, and the like. At any rate, until we can apply effective means for the destruction of their germs in the soil, manure, water and food, we can have no rational hope of their extinction in any given area.

Time forbids any treatment here of such great and important causes of disease as *parasites* which are as truly the cause of communicable and pestilential outbreaks as the bacteridian and protozoan, and are to be dealt with on the same general principles. These have led to great establishments for the production of parasiticides to be given to the suffering animals to destroy the broods of living invaders, already in the body, and ignore altogether the conditions which lead to the survival outside the body and in many cases to the transformations through ova, larva, pupa, and sometimes other forms to fit them for another career within the body of the original host. The fullest knowledge of the life-history of each parasite is just as essential to a rational management of each

parasitism as is a perfect knowledge of each microbe to the successful handling of the disease of which it is the essential and efficient cause.

ERRATA IN ARTICLE ON RECENT HISTORY OF VETERINARY MEDICINE

by JAMES LAW, (J. A. V. M. A. for July)

Page 505, 6th line from top for *Regnal* read *Reynal.*
Page 505, 7th line from botton insert *with* between *where* and *the.*
Page 505, 3d line from bottom for *lung plagues* read *lung plague.*
Page 506, 4th line from top insert comma (,) after *exposure to.*
Page 506, 24th line from top for *when* read *was.*
Page 506, 26th line from top insert comma (,) after *disease.*
Page 507, 17th line from botton for *he had* read *he had been.*
Page 508, 5th line from bottom insert *although* after *so that.*
Page 510, 18th line from top insert *but which* after *cattle.*
Page 510, 26th line from top insert *that* after *and.*
Page 510, 4th line from bottom for *Kirculbright* read *Kirkcudbright.*
Page 510, 3d line from bottom insert *the pestilence* after *throughout.*
Page 510, on bottom line for *Bote* read *Bute.*
Page 511, 15th line from top insert comma (,) after *light.*
Page 512, 6th line from bottom insert *and spread* after *escape.*
Page 520, on top line insert comma (,) after *things.*
Page 520, 21st line from top for *the result* read *this happy result.*
Page 520, 12th line from bottom for *be* read *seem.*
Page 521, top line, for *causes* read *cases.*
Page 521, 4th line from top for *condition* read *conditions.*
Page 521, 14th line from top for *arriving at* read *arriving in.*
Page 521, 2d line from bottom after *Europe* insert *and.*
Page 522, 2d line from top insert comma (,) after *owners.*
Page 523, 6th line from top for *infesting* read *infecting.*
Page 523, 3d line from bottom for *saccharomyses* read *saccharomyces.*
Page 524, 13th line from top insert comma (,) after *from.*
Page 524, 7th and 8th lines from bottom for *Gnischer's* read *Meischer's.*

J. A. V. M. A. for *August*

Page 655, 5th line from bottom for *1912* read *1902.*
Page 656, 12th line from top for *evil* read *fatal.*
Page 660, 6th line from top put *excellent measure* in italics and follow by the word *truly.*
Page 661, 10th line from top for *its* read *their.*
Page 662, 13th line from top insert comma (,) after *support.*
Page 664, 11th line from bottom for *filterable* read *nonfilterable.*
Page 665, bottom line insert hyphen (-) between *salt and glazed.*
Page 666, 11th line from bottom insert *is* before "*not at all impossible*".
Page 666, 4th line from bottom insert *subsequent* before "*contamination*".
Page 667, on bottom line insert mark of interrogation (?) after "*infamy*".

—Dr. J. H. McNeil, formerly of Brazil and lately at Philadelphia, Pa., has been appointed Chief of the Bureau of Animal Industry, Department of Agriculture at Trenton, N. J. Dr. McNeil began his duties August 1.

CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."

HEMORRHAGIC SEPTICEMIA IN MULES

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Pasteurellosis or the diseases caused by bipolar bacilli and known by various names as hemorrhagic septicemia, fowl cholera, swine plague, stockyards pneumonia, etc., has been reported from various parts of the United States and foreign countries and because of the losses caused by it each year, is fast becoming of great economic importance. Considerable literature has been written on this disease as it occurs in cattle, swine and some of the other wild and domestic animals though but little can be found regarding the diseases in equines.

Lignieres[1] found an organism belonging to this group in the blood and exudates from cases of equine influenza, and others have since found this organism associated with that disease, but confirmation as to its being the direct cause of influenza is lacking, more recent works indicating that the disease is due to a filterable virus. "The *Bacillus bipolaris septicus* is, however, of etiological importance as the cause of secondary inflammatory processes, especially in the pectoral form of this disease."[2]

Webb[3], in India in 1907, described an outbreak of hemorrhagic septicemia in mules similar to the one described in this paper. His cases were all in young mules under two years of age which died very suddenly and on necropsy showed lesions of hemorrhagic septicemia. Microscopical examination of blood from the ear revealed bipolar organisms of the hemorrhagic septicemia type uniformly and richly distributed throughout every field examined. In conclusion he writes:—

> "As these specimens were not taken until about eight hours after death, and as up to that time I had never met with cases of septicemia hemorrhagica in horses or mules, and could find but scanty literature on the subject relating to the disease in those animals, I was a little doubtful as to whether I was justified in assuming that these organisms were the primary cause of the disease. If they were not, then the only explanation of their presence in such

abundance and in pure culture was that they were present in such numbers in the intestines at the time of death that at the onset of putrefaction they were the first to reach the extremities to the exclusion of organisms of the ordinary putrefactive type."

Two years later Webb[4] also reported outbreaks in horse and donkey young stock due to a bipolar staining bacillus of the fowl cholera type and characterized by an acute and fatal pneumonia.

Gillette[5], in India in 1912, described a case in a horse which showed symptoms and post-mortem lesions of hemorrhagic septicemia. Smears from the heart blood showed scanty organisms, while those from the intestinal exudate showed them in large numbers and apparently pure.

On August 17th, 1916, we received at the laboratory, organ sections of a mule from one of the agents of the Board* with information that four of these animals died suddenly twenty-four hours after first symptoms. A microscopical examination of these specimens revealed the following:—Lymph glands hemorrhagic and edematous, lungs congested, pleura petechiated, heart petechiated, spleen slightly enlarged—capsule petechiated, intestines ecchymotic, mucous membranes hemorrhagic.

Smears from the heart blood and organs after staining with methylene-blue revealed large numbers of cocco-bacilli showing characteristic bipolar staining. Cultures were inoculated on plain agar and in bouillon, giving in twenty-four hours a pure growth, characteristic of the hemorrhagic septicemia group of organisms and following which we made a diagnosis of hemorrhagic septicemia.

Laboratory animals were inoculated as follows:—

Guinea pig No. 5353/1, Wt.—280 grams—inoculated August 18th, 1916, 0.01 c.c. twenty-four hour bouillon culture of ***B. bipolaris*** (mule) intraperitoneally—result negative—died 8/31/16—necropsy—no lesions.

Guinea pig No. 5353/2, Wt.—280 grams, inoculated as No. 1—result negative—discarded 10/12/16.

Rabbit No. 5354/1, Wt.—1980 grams—inoculated as guinea pig No. 5353/1—result negative—died 9/5/16, no lesions.

Rabbit No. 5354/2, Wt.—1840 grams—inoculated as No. 1—result negative—discarded 10/12/16.

*Dr. Joseph Johnson, Lancaster, Pa.

A visit to the premises provided the following information: Owner had mules on the premises for the last fifteen years without a loss from any trouble which would indicate an infectious or contagious disease.

Case No. 1: On August 10th, 1916, a mule about one year of age appeared to be slightly off feed and at evening of the following day refused all dry food but ate freely of newly cut grass. On the morning of the 12th the animal was found dead.

Case No. 2: On August 12th a year old mule appeared drowsy and showed severe conjunctivitis. On the following morning it became very restless and died after getting up and down for two hours.

Case No. 3: On August 14th, mule one year old showed the same symptoms as the preceding and died the same day.

Case No. 4: On August 15th fourth young mule was taken with the same symptoms and died the following day. This case was autopsied by Dr. Johnson and showed typical lesions of hemorrhagic septicemia. Specimens from this case were the ones forwarded for examination.

Case No. 5: On August 17th the last young mule refused to eat—became drowsy and weak with an unsteady gait that was more pronounced the following day. It died during the night of the 18th. A necropsy was performed and the following notes taken:

Marked icterus, sero-gelatinous infiltration of subcutaneous tissue over abdomen, thorax and more especially in the axillary and inguinal regions. The exudate was yellowish, in some areas local hemorrhages were present. All subcutaneous lymph glands enlarged, edematous, uniformly yellowish discolored, some showing marked hemorrhages.

Upon laying open the thoracic and abdominal cavities the petechiae, ecchymoses and hemorrhages gave the carcass the appearance of having been intentionally spattered with blood.

Thoracic cavity contained a small amount of yellowish fluid. Pleura speckled with hemorrhages of various sizes. Parenchyma of lungs congested, on section dotted with small hemorrhages. Lymph glands swollen and hemorrhagic.

Epicardium and endocardium covered with hemorrhages of various sizes, myocardium soft and organ colored. Heart blood coagulated—currant jelly clot,

The abdominal cavity contained a small amount of yellowish fluid. Peritoneum, mesentery and omentum studded with hemorrhages. Mucous membrane and serous coat of stomach showed numerous petechiae. Intestinal walls thickened and edematous. Both the serous coat and mucous membranes showed numerous hemorrhages varying in size from that of a mustard seed to a half dollar. This condition was noted throughout the entire intestinal tract. Mesenteric lymph glands greatly enlarged, soft and hemorrhagic.

Liver congested, soft and friable. Kidneys congested, very friable, capsule slightly petechiated and peeled readily.

Specimens from various organs, heart blood and exudates were collected and brought back for examination.

In questioning the owner with reference to the handling of these animals during the summer months we were informed that they had not been on pasture at all and that the feed consisted of hay cut from high ground during July of the same year and fed soon after cutting. Upon examination it was found to be free from moulds but badly stained from exposure to rain. The corn fed was old and had been a part of the ration for the past eight months. Western oats had been fed since the last of May. There had been no radical change in the method of feeding and the feed itself appeared to be in good condition. The water supply was excellent, coming from artesian wells. Remaining animals in the stable, including three horses over twelve years old and one mule five years old, appeared perfectly normal.

On returning to the laboratory, smears of the heart blood and exudates were examined after staining with methylene blue. In both cases large numbers of typical bipolar staining organisms slightly larger than the fowl cholera type, were uniformly distributed. Agar and bouillon tubes were inoculated from all specimens and in every instance pure cultures of this bipolar organism were obtained.

Animal inoculations were made from cultures obtained from the heart blood using larger doses than in the case of strains isolated from case No. 4.

Rabbit No. 5359/1, Wt. 1370 grams—inoculated August 23rd, 1916, 0.3 c.c. twenty-four hour bouillon culture of *B. bipolaris* (Mule No. 5) intravenously—results negative—discarded 10/12/16.

Rabbit No. 5359/2, Wt. 1590 grams—inoculated 0.3 c.c. subcutaneously—results negative—discarded 10/12/16.

Guinea pig 5360/1, Wt. 380 grams—inoculated 0.2 c.c. intraperitoneally—result negative—discarded 10/12/16.

Guinea pig No. 5360/2, Wt. 420 grams—inoculated 0.2 c.c. subcutaneously—result negative—died 9/15/16—no lesions.

Having been recently isolated from a virulent outbreak, it was rather surprising to find these strains avirulent for rabbits and guinea pigs. On the other hand it corroborates the experience of the junior writer while working with strains of bipolar organisms isolated from a virulent outbreak of influenza*. In this instance recently isolated cultures failed to kill laboratory animals and rendered difficult the identification of the strains, as at that time there was no opportunity to examine these organisms in tissue fluid, they having been obtained from tracheal swabs.

We have had difficulty in keeping the cultures, isolated from these mules, growing on artificial media. Like other members of the group it was thought that transplantation once a month would suffice to insure against their loss, but this did not prove to be the case as fresh young cultures would die out suddenly without apparent cause. Other laboratories experienced the same difficulty with strains supplied them.

In an effort to determine the source of infection, feed and water samples were collected and cultural and animal inoculation tests were made, but with negative results. This, however, does not eliminate these factors as possible sources of infection, inasmuch as pure cultures of isolated strains, before stated, proved avirulent for experimental animals.

. In conclusion we may state that an outbreak of hemorrhagic septicemia occurred in young mules in Pennsylvania, the diagnosis being based on the fact that the two cases autopsied showed characteristic lesions of hemorrhagic septicemia, as seen in the acute form of this disease in cattle, without the presence of pneumonia or any other condition to indicate that the lesions were of a secondary nature, furthermore in both cases the heart blood and tissue fluids were found teeming with typical bipolar organisms, cultures of which were readily isolated, and showed the growth characteristic of this group.

*Equine Influenza—Reichel, Harkins, Munce and Boerner. Read before Penna. State Vet. Med. Ass'n, March, 1916.

LITERATURE

1. *Bulletin de La Societe Centr. de Medicine Veterinaire,* 1897, p. 335.
2. Hutyra & Marek, Vol. 1, p. 193.
3. *Journal of Comp. Path. and Therapeutics,* Vol. XX, Part 2, 1907.
4. *Ibid,* 1909, Vol. XXII, p. 105.
5. *Ibid.* 1912, Vol. XXV, p. 321.

BOVINE HEMATURIA

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Definition. This disease which appears most frequently at the end of winter is characterized by the emission of blood in the urine of vesical origin.

Symptoms. The temperature in the primary stages of the disease is normal and the animals show no outward sign of being affected except that they urinate more frequently than normally, and pass blood at the end of the act of micturition. In the later stages of the disease the animals develop a depraved appetite, become emaciated and anemic owing to repeated blood losses, edemas and diarrahoea supervene, and the animals eventually die of cachexia. The duration of the disease is extremely variable. Through anatomical consideration it is shorter in males than in females owing to the sigmoid flexure in the male's penis. Females are able to pass much larger clots, hence the urethra is less liable to become obstructed. Owing to the fact that in the primary stages of the disease the earlier symptoms may be overlooked, it is a matter of extreme difficulty to state the actual duration of the disease; but as a rule animals do not die under a year after they have first manifested symptoms; though some few cases with a hemophiliac tendency die more rapidly. On the other hand many animals live for years in apparent good health except for the emission of bloody urine. In the late stages of the disease a number of complications may arise; the commonest termination being the invasion of the bladder and kidneys by pyogenic cocci, resulting in a cystitis and pyelonephritis. Other symptoms to be noted are blood clots hanging to the tail, the vulval hairs being blood stained and in some cases there is strangury. The eyes become sunken and the mucous membranes blanched. Diarrhoea is common in the final stages of the disease. There are some few cases in which the disease has run an apparently benign course without

exhibiting marked symptoms, which have terminated fatally and quite suddenly from hemorrhage the carcass being practically bloodless. The average age at which animals become affected is six years. The youngest at about two years, and the oldest at from twelve to fourteen years. This disease is associated with poor farm lands; woodland, newly cleared farms, or farms that are either neglected or are falling out of cultivation; hence it has been called a poor man's disease.

Lesions. In nearly all the writings mention is made of the initial pin-point hemorrhages; this appearance, however, can be seen in normal contracted bladders, and consists of small varicosities and tufts of blood vessels which are presumably necessary owing to the great amount of distention which the bladder must undergo. However, the initial lesions partake somewhat of this character. The mucous membranes vary markedly in the different cases. Sometimes they are in rough raised red ridges, in others they appear normal except for eroded patches which are bleeding, and submucous hemorrhages; these are the usual forms of early cases. In the older ones there is fibrous thickening, a tendency to proliferation and the formation of papillomata. The walls of the bladder may have become considerably thickened and the organ loses all power of dilating; in such a case there is almost a constant dribbling of urine containing as a rule but little blood. This is the most chronic form of the disease. In other cases the organs become permanently dilated through the occlusion of the urethra by clots. This is the most chronic form of the disease. Occasionally large vegetations of a peduncular character occur in a bladder that otherwise appears fairly normal. Moussu remarks that the lesions found in the bladder are in various stages, and this has also been noted in the British Columbia form of the disease. Rarely cicatrices are encountered, proving that as a rule there is no tendency for the lesions to heal, which goes a long way to explain the chronicity of the malady. As a general rule the lesions are most marked at its inferior part; in rare cases are the ureters affected, in which event one or other of the kidneys may become cystic. The lesions appear most active towards the end of the stabling period, namely about the month of February. Thirty-nine post mortem examinations have been made during the investigation, and a number of bladders have been examined at the laboratory from other sources. This in brief describes the usual

lesions. The other organs in the body generally appear healthy though occasionally the condition of the liver is not normal, and in two or three cases there have been complications in the shape of cancer. In the early cases all the organs appear normal, with the exception of the bladder.

Urine. The amount passed in the twenty-four hours of course depends in a measure on the size of the animal. In an experiment which was conducted for a twenty-four hour period two redwater cows passed a litre per hundredweight and two normal cows passed a like amount. The redwater cows urinated one ten times and the other nine times and the normal cows both passed their urine six times during this period. In one case the amount of blood lost in the twenty-four hours was 1101 c.c. of actual blood, the other 738 c.c. Experiments carried out by H. L. Keegan at Guelph go to prove that the amount of urine voided by cows in a normal state of health is approximately equal to that passed by redwater animals, viz., one litre for every hundred pounds live weight. The blood loss mentioned is of course a very heavy one and a day or two later might have dropped to a fraction of that amount. There are ups and downs in the quantity passed during the day, largely dependent on the amount of exercise and straining. Clots in the urine are common in the late stages when blood is present in larger quantities, earlier the salts in the urine are in sufficient quantity to prevent coagulation. On sedimentation as a rule the red cells have a normal appearance. The supernatent liquid is generally of a clear amber color. Pigmentations occasionally occur, especially in the urines which are contaminated with bacteria. There is, however, a pigmentation seen which might be mistaken for blood; this appears to be in the nature of a hemoglobinuria which has been noticed in late cases, and also in apparently normal animals. According to Miller post hemorrhagic hemoglobinuria occurs after great blood loss; the loss of blood engenders a hemolysin inducing a hemoglobinemic autolysis with hemoglobinuria. The reaction of the urine is generally strongly alkaline, but in a few instances the reaction had become neutral owing to the excessive amounts of blood contained in it. At first the urine is practically sterile but after a time when blood is constantly present in the bladder it becomes contaminated, streptococci are often found and these have also been encountered in the kidneys when infection had spread up the ureters. The calcium

oxalate crystals which are believed to play such an important part in giving rise to the lesions are more plentiful in the early stages of the disease. According to Roger the number of calcium oxalate crystals are not always a true indication of the amount of oxalates in the urine. When there is much blood present in the urine the crystals are often difficult to find. Gordon states that union takes place between the oxalates and albuminous substances. The crystals assume many shapes, the commonest being the envelope form and are often present in large numbers. Other crystalline forms are not mentioned as they do not appear to play an important part in the production of this disease. On post mortem the kidneys usually look healthy, except for the occasional presence of calculi. A number of these calculi were sent to the Dominion Chemist for analysis who reported that they did not contain oxalates. Injection of dilute solution of oxalic acid into the bladder caused the production of large numbers of crystals of calcium oxalate and if these injections are continued a condition of the bladder is produced clinically indistinguishable from an ordinary case of hematuria.

Blood. In the early stages the blood appears normal. The first sign is a variation in the size of the red cells; this is followed by the usual changes seen in secondary anemia. There is no variation in the percentages of the various leucocytes, except in the cases of pus infection, which have been mentioned before, in which event there is an increase in the number of the polymorphonuclears. The blood picture changes from month to month as the disease advances or recedes. The clotting property of the blood is generally low but shortly before death an increase has been noted, and large obliterating clots are formed occluding the urethra.

The experimental drenching of cattle with oxalic acid. Some of this work was included in the report of the Veterinary Director General for 1914. As will be observed by reading this report the first experiments on drenching showed that oxalic acid was very toxic, but that later on the animals become accustomed to it. One animal four months old was killed by overdosing in sixteen days, 1170 grams of oxalic acid having been given. A two-months-old calf received 101 doses from January 2nd to June 28th, 2365 grams, the animal died on the later date. These large doses produced the usual symptoms due to oxalic acid poisoning which were given in

the report mentioned. Albumin and red cells were noted in the urine together with numerous oxalate crystals. After the death of these animals a dose was arrived at which could be borne with safety and in all subsequent experiments made, 30 grams were given per day, the animals having an occasional rest. Three animals were dosed for the periods set down, one of them, *Cow 4,* received 395 doses (11850 grams) from June 30th, 1914, to July 5th, 1916. She was killed on October 23rd, 1916. Her bladder was rough and thick, all the other organs looked normal and she was in excellent condition when killed. *Cow 5,* from May, 1914, to March 14th, 1917, this cow was given 5771 doses equalling 17310 grams of oxalic acid. She kept fat and well until the autumn of 1916. In November despite care and extra food this animal began to go down hill and in the later part of December and January began to pass red urine until she finally got down and became so weak that she was killed on March 29th, 1917.

Post Mortem Notes. Carcass, thin and dropsical. Excess of fluid in abdomen. All organs appeared normal except one kidney and the bladder; this kidney was slightly cystic, a few small brown calculi were found in the kidneys. The bladder had the typical appearance of a case of hematuria. There were many flocculent masses of crystals floating in red urine, the mucous membranes showed numerous petechial spots and vegetations. The blood was anemic clotting feebly. There were many oxalates in the urine.

Steer. The experiment began November 26th, 1913, the animal being two months old. Up to March 31st, 1917, this animal has received 697 doses of oxalic acid equalling 20910 grams. At this date of writing the animal is still plump with a good coat; he is not nearly as large as he should be and is small boned and stunted, though he came of large stock. The casual observer would never suspect that he had received such a large amount of a toxic drug. When the experiment was first started 8 gram doses were given, this amount was increased up to 60 grams a day but as toxic symptoms appeared the dose was reduced. Afterwards a uniform dose was given to all the animals, i. e., 30 grams per day, which was usually for six days in the week.

Summary of experiments. The long period that elapses before the appearance of symptoms (six years on the average in natural cases) makes experimentation a slow process. The first two animals were killed by excessive dosing. One animal was

killed too early in the experiments, another still survives and the fifth developed the disease and went through all the symptoms of a natural case. On post mortem the lesions were unmistakably of hematuria. The steer's case is most remarkable as it shows how much oxalic acid can be borne without any marked ill effects. It is true that he has passed albumin and abnormal amounts of crystals which will in time cause serious trouble, but we have noticed that young animals resist better than the old, either from the administration of oxalic acid by the mouth or by injection into the bladder. This is further borne out by the occurrence of the disease in nature. Doubtless the feeding of oxalic acid bearing plants would be the best way of reproducing the disease, but owing to the difficulty of getting these in sufficient quantity commercial oxalic acid was used.

The experimental injection of calcium oxalate crystals into the bladder. These experiments were described in the report of the Veterinary Director General for 1914. Three animals were used and they all exhibited similar symptoms, i. e., straining, and after repeated injections voided blood. One animal died too early in the experiments for any lesions to have developed, the other two on post mortem showed marked thickening of the walls of the bladder. These experiments were not kept on as long as the drenching experiments, partly owing to the difficulty experienced in making typical calcium crystals and it cannot be said that they developed typical lesions of hematuria. The work, however, established the fact that the crystals were capable of wounding the bladder and causing hemorrhage. In one of the cases (Heifer 3.) it was interesting to note that at times she passed urine which coagulated on standing; this was not always at the times when there were the largest number of red cells in it, evidently the crystals were wounding the bladder walls sufficiently to allow the escape of serum but not of red cells. In natural cases an identical condition has been seen, especially in the later stages when there appears to be an exudation of serum rather than of blood from the bladder.

Experimental injections of dilute solutions of oxalic acid into the bladder.

Experiment 1. Heifer, six weeks old. July 13th, 1914. Was given an injection into the bladder of 5 grams of oxalic acid in water. From July 13th to February 5th, 1915 she was given 21 doses, equaling about 100 grams of oxalic acid, or 5 grams to the

dose. No injections were made after February 5th as the heifer plainly showed that she was going down hill fast and was passing red urine. April 8th. A large clot several inches long was seen hanging from the vulva.

Blood drawn from the general circulation coagulated in 33 minutes. April 30th. The heifer was passing large clots like a bad case of hematuria. May 1st. Straining and passing clots. May 6th. Heifer moribund, killed.

Post Mortem Notes. Carcass greatly emaciated, edema under jaws. Excess of fluid in the pericardial sac, also in the abdomen. Kidneys large, pyelonephritis, ureters enlarged. Bladder dilated, the lesions found were those of a natural case of hematuria.

Experiment 2. Aged cow. From June 7th, 1915 to November 20th, 1916; twelve injections of five grams of oxalic acid were given in water. From March 24th, 1916 to October 3rd, 1916 no doses were given, it being thought that the animal might break down at any time, for this reason they were started again on October 3rd, resulting in symptoms being presented in December; the animal passed blood during December, January and February and on February 23rd was killed as she had been down for several days.

Post Mortem Notes. The kidneys showed pus infection, streptococci and there were some calculi present. The bladder had eroded patches and were bleeding as in a natural case. Oxalates were present in the urine.

Experiment 3. A young heifer. This animal received the same number of injections as in Experiment 2. So far she has not developed the disease though after each injection there have been the usual signs of straining and blood has been recorded several times in the urine. Experiment not concluded.

Summary. Injections of dilute oxalic acid solutions provoke great irritation and subsequently the urine is stained with blood. Calcium oxalate crystals are formed in the bladder as soon as the acid comes in contact with the urine and mucus. After a time the urine becomes contaminated with bacteria which no doubt play a part in aggravating and maintaining the lesions. It is probable that the acid has a direct effect on the walls of the bladder as well as the crystals. Two out of the three cases developed a disease indistinguishable from natural cases of hematuria.

Controls. A number of animals have served as controls to the experiments. On an average 65 head of cattle have been kept on

this farm during the course of the experiments, and not a single case of hematuria has developed among them.

Conclusions. The oxalic acid theory which was advanced in the report of the Veterinary Director General for 1914, has been backed by the foregoing experiments. There is one important omission in this report concerning the bacteria which contaminate the bladder after the disease has progressed for a time. In the previous reports due emphasis had been made of their probable significance in maintaining the lesions in a state of activity. Galtier had the same idea but attributed distomatosis as the predisposing cause of the disease which, as Moussu points out, is entirely wrong. Galtier, however, thought that irritant plants had something to do with the affection. With oxalic acid to wound the walls of the bladder, either through the cutting action of calcium oxalate crystals or through the effect of the acid followed by bacteria to keep the lesions active, seems entirely to fit the case. Moussu in a review of the work done at Agassiz says: "This idea is certainly original, and agrees fairly well with that put forward before by Pichon and Sinoir on the rôle of certain special plants and nothing authorizes one *a priori* to say that it is not well founded or exact". The only objection Moussu raises is that if hematuria were only the consequence of animals eating irritant plants, then that in the majority of cases they should recover when removed to healthy regions. He says, however, that this might be objected to on the grounds that the lesions once firmly established cannot be cured. This, no doubt, is the correct interpretation, and in British Columbia such cases have occurred; as Professor Moussu remarks, a cure may occassionally take place, but it is not the rule and in all the experimental animals upon which constant observations have been made (numbering 66) not a single case has lived over 5 years after showing the initial symptoms. There are cases on record where animals have lived for longer periods but there are no such authentic records for British Columbia. Remissions have occurred during which periods the animal seemed in perfect health, but they always broke down again and have never lasted for much more than a year. Moussu states as follows: "In all countries bovine hematuria is a disease of certain poor regions of which the soil and flora present special characters. The idea of the influence of soil, the flora and the action of certain plants, have been sustained everywhere. The fact that cultural transformations in modi-

fying the flora may bring about the disappearance of hematuria in the affected regions, can be interpreted in favor of the idea emitted by the author''. It is not necessary to go into great detail over this matter as it was fully explained in the 1914 report, it is sufficient to state, that in British Columbia the disease is confined almost entirely to the bench lands bordering on the Pacific. Clelland has noted the same thing in Australia and Case in Hawaii. In view of the foregoing facts it cannot be expected that veterinary surgeons can hope to successfully treat this malady, or at any rate do more than prolong life and perhaps turn an animal into beef which otherwise would have died naturally. With this end in view the first thing to do is to tie the animal up and to keep it as quiet as possible. This useful precaution appears to have been overlooked in the articles dealing with treatment, as exercise invariably augments the percentage of blood in the urine. Lime salts, iron and tonics have proved beneficial, together with occasional doses of magnesium sulphate. The chief object should be a prophylactic one consisting in the application of lime to the land and in keeping the animals away from rough uncleared areas. Watering the animals' hay with lime water has been recommended to a number of farmers and some of them report favorably on its use, but the usual difficulty has been experienced in getting farmers to do this regularly. The disappearance of the disease from certain farms and districts following agricultural improvement has been observed both in this country and in France which is another corroborating point in favor of the theory. It is to be hoped that other experimenters will undertake researches. Apparently very little work in Europe is being done now on this important disease of cattle. In a recent article Roger remarks, that oxalemia should have a place in veterinary pathology and believes that it plays an important part in the diseases of horses; why not then for cattle?

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FORMALIN TREATMENT IN MASTITIS

J. K. BOSSHART, Camden, N. Y.

Good results have been obtained in mastitis in cattle from the use of formalin and turpentine as advised by J. N. Frost. Half ounce doses, however, have been found too toxic for some individuals. Such a dose in one pint of raw linseed oil was given to one large cow. Intense coughing and superficial respirations with a collapsible shaking motion of the abdominal muscles after each respiration followed immediately. Anorexia persisted with these symptoms and polyuria for five days. By the application of a suspensory bandage with a wet pack the local symptoms were ameliorated. Recovery finally was complete.

Similar observations have been made in another case. One teaspoonful or about one-fifth of an ounce in one-half pint of raw linseed oil twice to three times daily alternated with one ounce of turpentine in oil seems to be a safer dosage. If no untoward results occur the doses may then be increased with the amount of oil. Laxative results do not seem to be more than from grass.

A suspensory bandage with frequent milking of the affected quarters seems to be a large factor to hasten recovery. Wet pads in warm weather and packs of some bland oil for the night and in cold weather, kept in place by the suspensory bandage, seem to be very beneficial.

Abscess formation has followed in some cases, which was surgically treated where possible. In other cases the abscesses broke open after a while and recovery took place in due time.

—Dr. G. P. Mayer, formerly of Elk Rapids, Mich., has purchased the interest of Dr. Bowman in the veterinary practice of Bowman & Davidson of Tecumseh, Neb. Dr. and Mrs. Mayer made the trip to their new location by automobile.

—Dr. J. H. Woodside of Groton, N. Y., has gone into veterinary practice at Redmond, Wash.

—Dr. C. A. Raque has removed from Spokane, Wash. to Fresno, Calif.

—Dr. Gilbert S. Weaver has removed from Mitchell to Brookings, S. D.

ABSTRACTS FROM RECENT LITERATURE

VESICAL CALCULUS IN A MARE. Dr. Arturo Galli. *Il Nuovo Ercolani.*—A sixteen-year-old mare had difficulty in micturition. She presented all the symptoms of trouble with the bladder. Cystitis perhaps, due to the presence of a calculus. Indeed one was readily detected by rectal examination, in the shape of a round body as big as a large almond, moving somewhat freely in the bladder. A metallic catheter introduced in the bladder and rubbing against the stone gave the peculiar noise and characteristic sensation. On account of the size of the stone its extraction was not possible in its entirity. It was decided to crush it. A lithothriptor of Civiale was procured. The instrument was introduced into the bladder and carefully brought in contact with the stone; this was, so to speak, immobilized with the left hand in the rectum and then secured between the jaws of the instrument, when it was readily crushed. The instrument was removed without having caused any injury to the mucous membrane of the bladder, an accident not uncommonly met with.

For a few days after the operation the mare passed urine slightly tinted red, micturition being slightly painful but being also accompanied with pieces of calculus. After eight days no more trouble was observed and rectal examination showed the bladder free of all stone. Recovery was perfect.

PHARMACOLOGIC STUDIES WITH COCAIN AND NOVOCAIN. George B. Roth. (From the Hygienic Lab., U. S. Public Health Service.) Copied from the *Jour. of Pharmacology and Exp. Therapeutics,* Vol. IX, March, 1917, No. 6, p. 352.—The relative toxicity of cocain and novocain, as shown by animal experiments, varies, the variation being dependent mainly upon the animal employed as test animal. The relative toxicity of cocain and novocain for various animals, when given subcutaneously, is as follows: For frogs (Rana pipiens) the ratio is 1.0 to 1.4; mice 5.5 to 1; rats 10 to 1; guinea pigs 10 to 1; and rabbits 5.3 to 1. When given intravenously to rabbits, the ratio of toxicity of cocain to novocain is 3.9 to 1. When administered intravenously the rate of injection is a factor in modifying the toxicity. The subcutaneous administration of large sublethal doses of novocain in the dog and cat causes marked general symptoms which rapidly subside. The ratio of

the toxicity of cocain and novocain for mice, when fed on cakes containing these substances, is much wider than when given in any other way, cocain being about fifty times as toxic as novocain.

The effects of novocain on the isolated heart of the frog resemble the effects produced by cocain as a rule, both substances causing in Rana pipiens a decrease in heart rate and in the extent of systole. The relative toxicity on the heart of the frog is determined by perfusion experiments, is less for novocain than for cocain. On smooth muscle, the effect of novocain differs slightly from that produced by cocain. On the isolated ureter of the dog, the isolated urinary bladder and stomach of the cat, the isolated uterus of the rabbit, the effect of novocain differs from that of cocain only in being stimulating to a less degree when similar dilutions are used. On the isolated intestine of the rabbit, cocain stimulates in dilute solutions, and in concentrated solutions depresses intestinal motility; whereas novocain depresses it in any effective concentration. Both cocain and novocain increase blood pressure and respiration in rabbits with small doses, and depress with large doses. When given subdurally, the relative toxicity of cocain and novocain is practically the same, as shown by the comparative effects of large doses on the blood pressure and respiration. Death in rabbits after cocain or novocain poisoning is usually respiratory, but with novocain under certain conditions, death may be cardiac. REICHEL.

CLINICAL OBSERVATIONS. Major Veterinarians Robert and Thevenot. *Bullet. de la Soc. Cent.*—These are the records of a number of cases where the polyvalent serum of Leclainche and Vallée was used.

1—*Cyst* of the wings of the nostrils, which, in a mare, closed entirely the false nostril and interfered with the respiration. Incision, curettage, injection of serum. Cicatrization without suppuration in a week.

2—*Fistulous Withers* in which the spinous processes of the dorsal vertebrae were necrosed. Excision, tepid physiological serum washing, polyvalent application, rapid cicatrization. 3—*Cutaneous Quittor and Cracked Heels* simple serum treatment. 4—*Cartilaginous Quittor* operated by classical methol, dressing with serum. 5—*Open Comminuted Fracture* of lower jaw with large loose splinter of necrosed bone: cleaning of the wound, polyva-

lent serum dressing, recovery after the formation of small abscesses. 6—*Inguinal Cryptorchidism.* Same dressing as above after the operation. 7—*Wound of Castration.* The serum was used after castration by limited torsion or simple incision. The stump of the cord was washed with physiological serum first and the polyvalent injected in the wound afterward. Similar treatment had been used in several other cases of castration. In all the cicatrization was very rapid and permitted the horses to resume work in short time.

Ornstein, G. *Jour. Industrial and Engineering Chemistry,* Vol. 9, p. 817, 1917.—Dr. Alexis Carrel, in conjunction with Dr. H. D. Dakin, has evolved a comparatively new and revolutionary method for treating infected wounds, using a definite hypochlorite solution. A new method for the preparation of this so-called Dakin solution was worked out by G. Ornstein for the Electro-Bleaching Gas Co. The method consists in enclosing liquid chlorine in quantities of exactly 5 grams in glass tubes sealed at one end, the other end being drawn to a point. The method of breaking the ampoule with liquid chlorine in the alkali solution has been recently improved by a simple device. The glass bottle in which the solution is prepared is now closed by a rubber stopper, to the bottom of which is fastened a short piece of rubber tubing by means of a short piece of glass rod. The ampoule is fastened with its butt in the open end of the rubber tubing so that the pointed end points downward, and the ampoule is suspended pendulum-like containing the alkali solution. The Electro-Bleaching Gas Co. has recently completed arrangements with the pharmaceutical firm of Johnson and Johnson, New Brunswick, N. J., for the marketing of this new liquid chlorine product.

(See page 109, *Journal* of A. V. M. A., 1916, for further information on Dakin's Solution). Berg.

Severe Trauma of the Neck. Major Veterinarian Chouleur. *Bull. de la Soc. Cent.*—An eight year old sorrel mare, through an automobile accident, had the neck run through by a broken shaft. The neck seemed completely tetanized. On both sides there was a vertical wound; on one side it was at the base of the neck, a short distance from the anterior border of the scapula, on the other it was between the middle and the inferior third. These bruised

lacerated wounds were communicating by a channel between the muscles above the vertical axis. Torn tissues and a piece of wood were extracted. Boiled saline water was used first to clean the parts and then polyvalent serum was freely injected. This mode of treatment was followed with improvement, manifesting itself in a few days by a reduction in the swelling of the region, diminution and arrest of the suppuration, complete cicatrization in less than a month. Such a result could hardly be looked for, considering the extent of the wound, the complicated anatomy injured, the nature of the puncturing foreign body and the constant exposure of the wound, which could not be thoroughly protected from outside influences.

THE TOXICITY OF SALVARSAN AND NEOSALVARSAN. Louise Pearce and Wade H. Brown. (From the Laboratories of the Rockefeller Inst. for Medical Research). Copied from the *Jour. of Pharmacology and Exp. Therapeutics,* Vol. IX, March, 1917, No. 6, p. 354.—During the course of the work in chemotherapy, which is being carried on at the Rockefeller Institute, a series of experiments on the toxicity of salvarsan and neosalvarsan was undertaken. Mice, rats, guinea pigs and rabbits were used. Solutions of these drugs were injected subcutaneously, intravenously, and intraperitoneally in mice; subcutaneously and intraperitoneally in rats and guinea pigs; and intravenously in rabbits. Care was taken to inject the solutions as rapidly as possible, especially with solutions of neosalvarsan, the toxicity of which is known to increase very markedly on exposure to the air for as short a time as fifteen minutes (Ehrlich).

The toxicity of both substances was found to be quite irregular. The M. L. D. (Minimum lethal dose) as expressed in milligrams per 20 grams of body weight are as follows:

SALVARSAN

	S. C.	I. P.	I. V.
Mice	2.5	3.25–3.5	2.5–3.0
Rats	3.5–4.0	2.25–2.5	
Guinea Pigs	1.5–2.0	1.0 –1.5	
Rabbits			2.25

NEOSALVARSAN

	S. C.	I. P.	I. V.
Mice	2.0–2.5	1.5–2.0	3.5–4.5
Rats	1.5–2.0	1.0–1.5	
Guinea Pigs	1.5–2.0	1.5–2.0	
Rabbits			3.0–4.0

S. C.—subcutaneous. I. P.—intraperitoneal. I. V.—intravenous.

The M. L. D. was chosen as a standard for the toxicity of the drugs as being a more definite and clear cut value than the relatively indefinite D. T. (dosis tolerata). The M. L. D. includes all deaths of animals that can be attributed to the action of the drugs, whether an acute action within twenty-four to forty-eight hours or at a later time due to pathological lesions characteristic of the drug.

Following the administration of even smaller doses than the M. L. D. of both salvarsan and neosalvarsan, there may be a distinct impairment of the animal's metabolic functions as indicated by the loss in body weight and which may not be accompanied by gross or microscopic changes in the organs.

Of the two drugs, it is our opinion that neosalvarsan shows greater irregularities in toxicity than salvarsan, and produces much more marked pathological alterations and impairment of vitality in experimental animals. REICHEL.

PARALYSIS OF THE ANTERIOR CRURAL AND OF THE RADIAL NERVES. W. Wynn Lloyd, M.R.C.V.S. *Veterinary News.* Aged half bred mare bolted and fell on the off side. She was assisted to get up and, supported on either side, was taken to her stable. It was with great difficulty that she could be made to walk a few yards, the owner being obliged to extend her off fore leg while progressing and at the same time the off hind leg was entirely unable to bear the slightest weight. All the joints were more or less flexed. The only apparent outward and visible symptoms were a little swelling and bruising of the shoulder and thigh. Rectal examination revealed no fracture. A diagnosis of double paralysis was made, that of the crural nerve being incomplete as there was some sensation on the inside of the thigh. The mare was placed in slings. Fomentations were carried on for a few days and later counter irritation. After four weeks, the slings were taken off and the mare allowed some exercise. On account of the atrophy of the muscles of the shoulder and quarters the animal moved at first with difficulty but after massage and increasing exercise the locomotion soon returned to its normal condition.

A COMPARATIVE STUDY OF BACTERIUM PULLORUM (RETTGER) AND BACTERIUM SANGUINARIUM (MOORE). Leo F. Rettger and Stewart A. Koser. (From the Sheffield Laboratory of Bacteriology

and Hygiene, Yale University, and from the Storrs Agricultural Exp. Station.) *Jour. of Med. Research,* Vol. XXXV, No. 3, Jan. 1917, p. 443.

SUMMARY. Despite the several characters which the two organisms have in common, and particularly the serological reactions, *Bacterium pullorum* and *Bacterium sanguinarium* constitute two separate and distinct types, and each bears a specific relationship to the disease with which it has been associated in the past, namely, bacillary white diarrhea or fowl typhoid.

B. pullorum differs from *B. sanguinarium* in several important respects, aside from morphology. Dextrin, maltose, and dulcite are attacked by the latter, with the production of acid but no gas. *B. pullorum,* on the other hand, produces no visible change in media containing these agents except slight alkali production. *B.pullorum* acts upon dextrose and mannite with the evolution of appreciable amounts of gas, while the fowl typhoid bacillus, whether recently isolated or artificially cultivated for many years, does not produce gas in any of the carbohydrate media. Furthermore, prolonged cultivation of *B. pullorum* in the laboratory does not cause this organism to lose its power of producing gas in dextrose and mannite broth.

The methyl-red test applied to cultures grown in one per cent maltose-bouillon was found to furnish a practical method of distinguishing between the two types of bacteria, *B. sanguinarium* being methyl-red positive anl *B. pullorum* negative.

While both organisms are pathogenic to fowls of all ages in experimental inoculation, *B. pullorum* manifests itself only as the cause of natural epidemic infection in young chicks. On the other hand, *B. sanguinarium* attacks fowls of different ages, although it is of relatively little, if indeed any, significance as the cause of epidemic disease in very young chicks.

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SARCOSPORIDIOSIS IN CATTLE. E. E. Franco and I. Borges. *Arquivos do Instit. Bact, Camara Pestana* (Lisbon), Vol. 4, p. 269, 1916. Abst. in *The Review of Bacteriology,* etc., Vol. VII, Part 1, 1917, p. 10.

For many years the meat inspectors of the Municipal Abattoir at Lisbon have noted, especially among cattle coming from the province of Alentejo, a number of carcasses which presented generalised nodular lesions on the aponeurosis of muscles and in the subcutaneous tissue. The frequency of occurrence of these cases varies from time to time, the largest number of cases occurred in 1913, when the number of carcasses comdemned for this cause represented 5.6 per 10,000 of all animals killed in the abattoir. The nodules, which are of a light yellowish colour, measure from .25 mm. to 4 mm. in diameter. They may appear either as single discrete nodules, or may be massed together to form small subcutaneous tumors of about the size of a lentil. They occur only in the superficial muscle aponeuroses and in the subcutaneous tissue of the head, trunk and limbs. The parasite appears to be identical with *Sarcocystis besnoiti* of Besnoit and Robin. The general health of infected cattle does not appear to be affected materially. The cysts present two walls, an external structureless membrane and a cellular internal membrane which consists of a finely reticulated protoplasm in which a number of large spherical nuclei are to be seen. The inner surface of the internal membrane has the appearance of an endothelium. The cysts contain closely packed, slightly curved sporozoites. The sporozoites measure from 4.5 μ to 6.5 μ in length, and from 1 μ to 1.8 μ in breadth. Their extremities are rounded, one being always larger than the other. The nucleus is usually situated near the larger end. The protoplasm is finely granular, and presents one or more brightly refractile granules.

The sporozoites at the periphery of the cyst appeared to be implanted at their outer end in the lining membrane. From the inner end of the attached sporozoite a series of sporozoites radiate in an undulating line towards the center of the cyst. Two forms of imperfect, or degenerating, cysts are seen occasionally. In some the external capsule or membrane appears to be wrinkled, the internal membrane is not apparent, and instead of sporozoites the cyst contains round tissue cells and eosinophile cells. Other cysts contain a homogeneous substance, in which remains of the nuclei of the sporozoites can be seen here and there. The tissues surrounding the cyst present a zone of cellular infiltration, in which connective tissue cells, plasma cells, plasmocytes and percyto-chromoplasmatic cells can be seen. REICHEL.

INTERESTING FRACTURE OF THE OS CORONAE. Capt. J. F. Tutt, A.V.C. *Veterinary Record.* This horse had been previously lame after jumping and had been laid up for four weeks. Put to work again for one day, he again went lame and was a second time laid up for a week. He afterwards was sent to his work with an officer and kept at it for several months and again became lame. Laid up for a few days and having recovered he went again to work and finally one day while out exercising, he shied, jumped sideways and fell on a grassy bank. When he got up he was dead lame in the near fore leg. The condition of the animal was such that he was destroyed after a few days. At the post mortem the os coronae was found fractured in eight pieces which were firmly held together by a mass of formed connective tissue.

ANOMALY OF A VALVE IN THE HEART OF A HORSE. T. G. Brown, M.R.C.V.S. *Veterinary Record.* This was found in a horse used for dissection purposes. The pulmonary semi-lunar valve consisted of only two cusps, which were about equal in size. They were larger than normal, but of the usual shape. One was right anterior and the other left posterior. There was no interval between them nor was there any indication whatever of the presence of a third and the valve appeared quite competent. The heart was otherwise normal.

BEHAVIOR OF STRYCHNINE IN THE ANIMAL BODY. Robert A. Hatcher and Cary Eggleston. Copied from the *Jour. of Pharmacology & Exp. Therapeutics,* Vol. IX, March, 1917, No. 6, p. 359.

The authors conclude from their experiments in which biologic tests were used for the estimation of strychnin, that the poison is eliminated only to a slight extent in the urine of the cat, dog and guinea pig, not at all in the feces in normal conditions, but that it disappears fairly rapidly from the organism, being destroyed for the greater part by the liver, as shown by the results of perfusion experiments with the liver of the dog. REICHEL.

EARLY WORKERS ON ANTHRAX. Copied from *Jour. of A. M. A.*, Vol. LXVIII, No. 18, May 5, 1917, p. 1340.

To the Editor—Please let me know whether the following men were veterinarians or physicians: Chabert, 1780; Barthelemy, 1823; Rayer; Davaine, 1849; Pollender, 1850; Delafond, 1860; Solleysel, 1664. I have given the dates approximately when they wrote. All but Solleysel were concerned in the early work on anthrax; he worked on glanders.

(Signed) MAZYCK P. RAVENEL, M.D., Columbia, Mo.

Answer—Chabert, Barthelemy, Delafond and Solleysel were veterinarians.

Dr. Pollender, a physician at Wipperfurth, Rhenish Prussia, wrote the memoir on microscopic and microchemical investigation of the blood in anthrax: "Mikroskopische und Microchemische Untersuchung des Milzbrandblutes, sowie über wesen und Kur des Milzbarndes" (*Vrtljschr. f. gerichtl. u. offentl. Med.,* 1855, 8, 103-114).

Casimir-Joseph Davaine, born at St. Amand-Les-Eaux in 1811, graduated from the Paris Medical Faculty with the Dissertation "De l'hèmatocèle de la tunique vaginale" (1837); became a member of the Acadèmie le Mèdecine (1868) and wrote a memoir, crowned by the Institut, entitled, "De la paralysie gènèrale ou partielle des deux nerfs de la septième paire" (1852), but never held a public position. He wrote much on the entozoa, his principal contribution being "Traitè des entozoaires et des maladies vermineuses de l'homme et des animaux domestiques" (1860). His greatest contribution in his study of the bacteriology of anthrax: "Recherches sur la nature et la constitution anatomique de la pustule maligne" (*Compt. rend. Acad. d. cc.,* 1865, 40, 1296-1299). He died at his estate at Garches (Seine-et-Oise), Oct. 14, 1882.

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Pierre-Francois-Olive Rayer, born March 8, 1793, at St. Sylvain (Calvados), studied in Paris, at the l'école practique, Hotel Dieu and Maison royale de Santè, graduated with the degree of M.D. in 1818, and became a member of the Acadèmie de mèdecine (1823), and physician to the Bureau central des hopitaux (1824), Hopital St. Antoine (1825) and Hopital de la charite (1832). He succeeded Magendie as president of the Comitè consultatif de l'hygiène publique (1843), and became consulting physician to Louis Philippe (1848) and professor of comparative medicine and dean of the Paris Faculty (1862). He died at Paris, Sept. 10, 1867. His greatest works are his treatise on diseases of the kidneys (1839-1841) and the skin (1826) and his classical monograph on glanders and farcy (De la morve et du farcin chez l'homme," Paris, 1837). He also wrote a history of the epidemic of sweating sickness of 1821 (1822), a memoir on delirium tremens (1819), a report on the origin of the Barcelona epidemic of hematuria endemic in Mauritius (1839). He became co-editor of the *Rèvue mèdicale* in 1822 and of the *Journal universelle at hebdomadaire de mèdecine* in 1830.

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REICHEL.

—The wedding of Miss Augusta Wolfe Russell and Dr. Archibald R. Ward of the Bureau of Animal Industry, occurred July 25, at Forest Park, Md. They will be at home at The Mendota, Washington, D. C., after September 1.

—Dr. D. F. Hinckley has resigned as State Veterinarian of Oklahoma and removed to Watonga, Oklahoma.

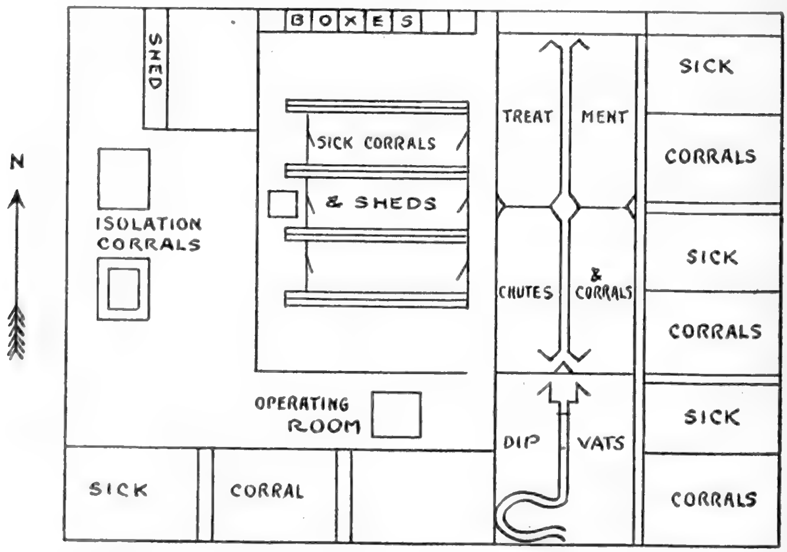
—The death of Dr. John M. Mitchell of Madison, N. J., has been announced.

ARMY VETERINARY SERVICE

REPORT ON VETERINARY DEPARTMENT AUXILIARY REMOUNT DEPOT, FORT BLISS, TEXAS

FIRST LIEUT. A. L. MASON, Veterinary Corps, Chief Veterinarian

1. ORGANIZATION:—The Veterinary Department of the Auxiliary Remount Depot occupies a space 470 feet by 765 feet in the northwest corner of the depot and consists of two buildings; a dispensary and an operating room, four sheds, twenty box stalls, and a system of corrals, including two treatment chutes, a dipping vat and isolation pens. The ground plan is as follows:



2. PERSONNEL:—6 veterinarians, 27 enlisted men, (2 Sgts., 5 farriers, 20 privates), 7 civilians, (1 foreman, 1 leader, 1 corral rider, 4 helpers), 9 laborers.

3. RECORDS:—A record of supplies received and issued, a daily ward record, and a record of animals received.

4. REPORTS:—(a) individual sick report of animals, (b) ward reports, (c) surgeons report, (d) report of veterinarian issuing and receiving point, (e) report of corral rider, (f) consolidated report of veterinarian in charge.*

5. All animals, as soon as they enter the hospital, are placed

*Appended

on a picket line, and as soon as their case is diagnosed they are supplied with a neck strap bearing their hospital number and a *linen tag* (colored) with the diagnosis and a synopsis of the future treatment they are to receive. They are then assigned to the proper ward. As soon as an animal is able to be treated in the sick corrals, it is assigned there and during the convalescence is treated in the chutes.

6. Animals are grouped according to disease, and as nearly as possible, assigned to corrals in groups. The following arrangement has been found satisfactory at this depot: surgical cases, influenza and strangles cases, pneumonia cases, eye cases, skin diseases, convalescing surgical and medical cases and isolation pens for glanders. No cases are retained in the stables unless they are unable to walk.

7. During the six months following April 1st, 1916, conditions were such that it was impossible to properly care for the sick. Large numbers were being received and issued daily, and facilities for caring for them were inadequate. Referring to Chart II, it will be seen that during April, May, June, July, August and September, 1916, the mortality was nearly .7 per cent per week of the number of animals on hand. This excessively high death rate was due mainly to shipping fever and its complications.

8. Shipping Fever: Shipping fever and its complications, pneumonia and purpura hemorrhagica, caused more trouble than any other disease. In our opinion at least 75% of the deaths were either directly or indirectly due to this disease. During the first six months of the establishment of the depot, there were 540 deaths, out of a total of 856 recorded, due to this disease and its complications. These 540 deaths were divided as follows: 337 due to pneumonia, 17 due to purpura hemorrhagica, 99 to uncomplicated influenza and strangles, 5 to congestion of the lungs, and 82 to septicemia, pyemia and unclassified causes. Such complications as occlusion of the lacrimal duct, infection of the facial sinuses, fistulas of the withers, paralysis of the recurrent pharyngeal nerve, (roaring), and strictures of the trachea due to tracheotomy in purpura hemorrhagica, are a few of the diseases which are directly due to shipping fever.

Gastro-Intestinal Colics—The majority of the colics were due to animals gorging themselves on grain, and consisted of gastric and intestinal flatulence and impaction. A few cases were due to

ingestion of sand and a few resulted in rupture of the diaphragm and stomach. Gastric and intestinal flatulence accounted for most of the deaths, as 99 out of 132 died from this cause.

CONTAGIOUS PLEURO-PNEUMONIA—An outbreak of this disease was discovered in one crowded corral late in January, but luckily stamped out before many animals were exposed.

TETANUS—3 cases of tetanus were encountered during the year. One of these was undoubtedly infected in our corrals. The other two were imported, one from Nogales and the other from the stockyards of El Paso. Of the three, one recovered.

INFECTIOUS ULCERATIVE STOMATITIS—An outbreak of this disease was encountered during November and December in the Regular and Militia camps in this vicinity, but luckily the Remount Depot escaped.

INFECTIOUS CONJUNCTIVITIS—This disease has been present during most of the winter and spring. Undoubtedly the infection is carried by the wind, on small particles of manure. It gave considerable trouble during the windy season and interfered somewhat in the testing for glanders with ophthalmic mallein, however, its interference with the reaction of the mallein did not materially delay the testing, as it was soon found that the inflamed conjunctiva was not affected by the mallein.

SKIN DISEASES—Several cases of ringworm appeared in the late summer and early fall. By the first of November we had about 500 cases. As the dip had not been constructed these cases were treated by the local application of iodine tincture. This necessitated considerable expense and labor, and was too slow and uncertain in its results. With our present facilities we need fear no further trouble from this source.

Mange has started to make its appearance within the last month. At present we have about ten cases under treatment. One of these is sarcoptic or red mange, the remaining cases are psoroptic.

Lice were first noticed in January. As it was too cold to dip the animals at that time, the worst cases were treated in the hospital. Since the middle of March all the animals have been dipped at least twice and some three and four times. At present very few of the animals are suffering from these parasites. These are being clipped as rapidly as our limited clipping facilities will allow.

GLANDERS—Since our special report on glanders (January 18, 1917) we have destroyed 38 animals, making a total of 61 head since the origin of the present outbreak. Over 30,000 doses of

ophthalmic mallein have been administered and the complement fixation test taken in about 200 cases, where the ophthalmic mallein test was doubtful or suspicious. Practically all of the cases destroyed were detected and isolated before they showed any clinical symptoms. Several of these, probably about 30, contracted the disease while in isolation with those having the disease. All animals placed in isolation were divided into three groups and none released until we were certain they were free from the disease. The last complement fixation test was completed May 14th and 64 animals were released from quarantine. The remaining 6 animals will be kept in isolation for another month, as they showed suspicious reactions. However, these reactions may be due to the previous administration of subcutaneous mallein.

Surgical Diseases—The surgical diseases may be divided into two classes, those due to injuries, viz., splinters, kicks, nail pricks, and accidents and those which resulted from disease. Referring to the table, it will be noticed that during the last 4 months the surgical diseases under treatment in the hospital were nearly one-half of the total sick report. Of these over 90% were due to splinters, kicks and nail wounds. The forequarters being the location of nearly one-half the injuries, the hindquarters one-quarter, the balance divided between the head, neck and trunk. Nearly all of these cases are preventable.

8. An analysis of our records and sick reports for the past year shows strangles and influenza, (shipping fever) including their complications caused the greatest mortality during the past year, while injuries due to splinters, kicks and nail pricks accounted for most of the hospital cases since January 1st, 1917. The contagious skin diseases, ringworm and mange, will undoubtedly cause more or less trouble during the coming summer and fall, but with the present facilities for dipping should be held in check.

9. An outbreak of glanders occurred during the past year and gave considerable trouble between November and March. However, at the present time we are practically free from any further trouble in this direction. The last case showing clinical symptoms was destroyed in April. Previous to this there had not been any cases showing clinical symptoms since early in March.

10. The most serious trouble confronting us from now on will be the control of shipping fever when newly purchased animals begin to arrive. Charts Nos. 1 and 2 show graphically what happened last year shortly after horses began to come in to the depot, and

we can reasonably expect the same conditions this year. Overcrowding and insanitary corrals will be the worst evils we have to contend with. While the veterinary department is capable of easily handling 600 to 800 sick animals per day, plenty of room, good hay and clean corrals will do more to reduce the mortality than medicine, after the animals are once infected.

11. Considering the cost, in animals, caused by shipping fever when newly purchased animals are received, it seems to us that something could be done along the lines of preventive treatment, especially when its control would mean so much to the Army under the present circumstances. It is an established fact that the main sources of infection are in the large horse and mule markets and the stock yards and cars of the carriers. Therefore we should begin at the time when animals are purchased by immunizing them against the infection and at the same time have the above mentioned sources of infection cleaned up, either by ourselves or the Bureau of Animal Industry, which is well organized and in a position to do the work effectively.

TABLE No. I

MONTHLY REPORTS ON DEATHS FROM MARCH 15th, 1917, to APRIL 25th, 1917

Month 1916	Cav. Horses	Art'y Horses	Wheel Mules	Lead Mules	Pack Mules	DESTROYED Incurable	DESTROYED Glanders	TOTAL
April	12		1		1			14
May	24		1		2			27
June	11	3	5		2			21
July	54	16	4					74
August		237	93		29			359
Sept.	105	55	1	2				163
Oct.	40	16	2	2		2		62
Nov.	26	18	2	1				47
Dec.	14	9	1	2		4-IC 1-W	7	38
1917 Jan.	15	6	1	2		2-C 1-A	17-C 3-A 10-WL&P	57
Feb.	7	3	1			2-C 1-A 2-L	3-C 2-L	21
March	6	7	2	2	1	2-C 2-A	7-C 2-A 3-L	34
April	8	7	1	3	1	2	1	23
TOTAL	322	377	115	14	36	21	55	940

Table No. II

DAILY AVERAGE OF ANIMALS ON SICK REPORT FROM JANUARY 1st, 1917, to MARCH 30th, 1917

		Jan.	Feb.	March	April
Medical Cases	Shipping Fever and its Complications	40.0	32.0	49.7	
	Gastro-Intestinal Diseases	3.3	1.6		.7
	Eye Cases, Both Medical and Surgical	19.1	9.1	3.8	
Surgical Cases (Mostly injuries received in corrals)	Head	16.4	9.8	6.2	11.9
	Neck	4.3	2.8	3.4	4.5
	Forequarters	65.5	49.1	26.4	25.3
	Hindquarters	30.6	30.0	17.7	18.2
	Trunk	2.6	1.5	3.8	4.8
	Total Daily Average, Surgical	119.7	93.5	57.7	64.7
Convalescents (Med. & Surg. not included above)		60.3	10.8	115.61	134.4
Entered		9.3	10.3	5.7	5.6
Discharged		19.4	7.2	4.1	10.8
On Sick Report		196.2	173.7	237.00	264.6

Table No. III

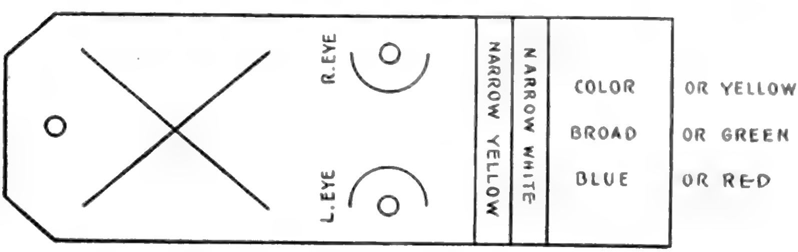
In 856 deaths reported, the following table gives a general idea of the proportion caused by the different diseases:

540 deaths were due to shipping fever.
132 deaths were due to gastro-intestinal diseases.
61 deaths were due to glanders.
2 deaths were due to tetanus
46 deaths were due to injuries received in corrals, including kick wounds, nail pricks, broken bones, etc.
75 deaths were due to cause not ascertained.

Table No. IV

Of 540 deaths due to shipping fever, the direct cause was as follows:

337 due to pneumonia.
99 due to different forms of strangles and influenza.
5 due to congestion of lungs.
82 due to septicemia, pyemia and miscellaneous causes.



LINEN TAG WITH COLOR STRIPES

COLORS AND MEANING. LINEN TAG (colored)

One broad blue—Hospital Case.

One broad blue, One narrow white, One narrow yellow—Influenza or Distemper and Complications.

One broad blue, One broad green—Surgical Cases.
One broad blue, One broad red—To be placed before inspection.
One broad blue, One broad yellow—Influenza and Distemper Thoracic Complications.
One broad blue, One narrow white, One narrow green—Lameness.
One broad blue (cross) X, Double diagonal (cross) (Stray in Hospital)—Loose horses that run away from organizations, etc.
One broad blue, One narrow yellow, One narrow green—Influenza or Distemper Surgical Complications.
One broad blue—Two eyes, left—right. Eye cases.

U. S. A. AUX. REMOUNT DEPOT

Daily Sick Report for Veterinarian in Charge

Date......................., 1917.

No. Animals Inspected for Entrance ....
No. Animals Malleined ....1............
No. Suspicious Reactions ....
No. Animals Inspected for Issue ....

REMARKS

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INFLUENZA OR STRANGLES....................TOTAL.............
Pectoral ....
Cellulitis ....
Catarrhal Strangles ....
COMPLICATIONS ....

SKIN DISEASE

Ring Worm ....
Mange ....

COLICS

Gastric Flatulence ....
Gastric Impaction ....
Intestinal Impaction...
Intestinal Flatulence ....

SURGICAL DISEASES

Head ....
Neck ....
Fore Quarters ....
Hind Quarters ....
Trunk ....
MISCELLANEOUS ....
ENTERED ....
DISCHARGED ....
DIED ....
TOTAL IN HOSPITAL ....

....

Signed.

SICK REPORT PUBLIC ANIMALS

Hoof No. .... Class ....
Ward No. .... Sex ....
Entered .... Discharged ....
Diagnosis ....
Prognosis ....

DAILY TREATMENT AND REMARKS

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U. S. A. AUX. REMOUNT HOSPITAL

Ward Report

Date ...., 1917

INFLUENZA OR STRANGLES

Pectoral ....
Intestinal ....
Cellulitis ....
Muscular ....
Catarrhal Strangles ....
Glandular Strangles ....

COMPLICATIONS

Pneumonia ....
Purpura ....
Laminitis ....
Cerebral or Spinal Contagious Pneumonia ....

SKIN DISEASES

Ring Worm ....
Mange ....

COLICS

Gastric Flatulence ....
Gastric Impaction ....
Intestinal Impaction ....
Intestinal Flatulence ....

SURGICAL DISEASES

Head ....
Neck ....
Fore Quarters ....
Hind Quarters ....
Trunk ....
MISCELLANEOUS ....
ENTERED ....
DISCHARGED ....
DIED ....
TOTAL IN HOSPITAL ....

REMARKS

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Signed.

AUXILIARY REMOUNT DEPOT

VETERINARY DEPARTMENT

Corral Rider's Daily Report..

Date....................., 1917

Corral No.	Hoof No.	Remarks
....	....	....
....	....	....
....	....	....
....	....	....

NAME ....

....Corral Rider.

U. S. A. AUX. REMOUNT HOSPITAL

CORRAL VETERINARIAN'S SICK REPORT

Date........................., 1917.

TOTAL

On Sick Report ....
Received from Wards ....
Discharged for Duty ....
Influenza Cases ....
Surgical Cases ....
Lameness ....
Eye Cases ....
Skin Disease ....

TOTAL ANIMALS IN CORRALS

F. 12—Released to Duty ....
G. 4—Clearing Corral ....
G. 7—Horse to be I. C...
G. 8—Eye Cases Under Treatment....................................
G. 9—Observation ....
G. 10—Observation ....
G. 11—Sick ....
G. 12—Sick ....
H. 7—Sick ....

REMARKS

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Signed.

—VETERINARY RESERVE CORPS. There is a prospect, in the near future, that a limited number of commissions, up to and including major, may be given to experienced men for the veterinary officers' reserve.

—Dr. Roy C. Smith of Enid, Okla., has received his commission as reserve veterinarian and has reported for duty with the 6th Cavalry at Marfa, Texas.

OPEN MARKET PURCHASE AUTHORIZED OF ANIMALS NEEDED BY THE GOVERNMENT FOR WAR PURPOSES

The Quartermaster General of the Army authorizes the following:

The Secretary of War has approved of the purchase in the open market of the mature specification animals needed by the Government for war purposes.

1. Any responsible dealer, breeder, or farmer who is capable of supplying the Government with one or more carloads of animals at a sanitary place, suitable for feeding, inspecting, branding, and loading them on cars is invited to furnish the following information to the purchasing officers in the remount zone in which he is located or proposes to supply animals:

(a) The number of mature specification animals of each of the following classes that he can supply: Cavalry and riding horses, light artillery horses, heavy artillery horses for siege batteries, wheel mules, lead mules, and pack mules.

(b) The price per animal at which he will enter into an agreement to supply animals of each class to the Government if called upon to do so.

(c) The places where he proposes to offer animals for inspection by Army purchasing boards.

2. Full particulars as to the specifications of animals, method of inspection, and requirements of inspection plants will be furnished on application to the purchasing officer of any one of the zones.

3. The Government purchasing officers charged with the details of buying horses and mules for the Army are as follows:

Depot quartermaster at Fort Keogh remount depot, Fort Keogh, Mont., for the northern remount zone, embracing the following States: Idaho, Minnesota, Montana, North Dakota, Oregon, South Dakota, Utah, Wisconsin, Wyoming and Washington.

Quartermaster at 410 Scarritt Arcade Building, Kansas City, Mo., for the central remount zone, embracing the following States: Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri and Nebraska.

Depot quartermaster, Fort Reno remount depot, Fort Reno, Darlington, Okla., for the southern remount zone, embracing the following States: Arkansas, Arizona, California, Louisiana, Mississippi, Nevada, New Mexico, Oklahoma and Texas.

Depot quartermaster, Front Royal Remount Depot, Front Royal, Va., for the eastern remount zone, embracing the following States: Alabama, Connecticut, Delaware, District of Columbia, Florida, Georgia, Kentucky, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, and West Virginia.

4. No agreement to furnish animals will be made with any dealer unless he is considered capable of supplying all the animals he offers to supply without sub-letting or calling upon other agencies to assist him.

5. At least one purchasing board in each zone will be reserved for the inspection of animals offered by farmers and breeders in not less than carload lots.

6. A bond of 5 per cent of the total consideration will be required as part of the agreement on any order for more than a hundred animals. At the end of each day's business a voucher for the purchase price of all the animals bought that day will be furnished the seller. The total value of this voucher will be paid on presentation to the purchasing officer of the remount zone in which the animals are delivered.

7. Under agreements to furnish 100 animals or less no bond will be required but 5 per cent of the purchase price will be deducted from the amount of the voucher for each day's business and will not be paid until all the animals are delivered.

COMMITTEE ON PUBLIC IFORMATION.

—ADVISORY BOARD FOR ARMY VETERINARY CORPS NAMED. In reorganizing the Veterinary Corps of the Army Medical Department, the Surgeon General has selected the following veterinary advisory board: Dr. C. J. Marshall, State veterinarian of Pennsylvania; Dr. David S. White, dean of the College of Veterinary Medicine, Ohio State University, Columbus, Ohio; Dr. Louis A. Klein, dean of the School of Veterinary Medicine, University of Pennsylvania; Dr. V. A. Moore, dean of the New York State Veterinary College, Cornell University, Ithaca, N. Y.; Dr. John R. Mohler, assistant chief of the Bureau of Animal Industry, Washington, D. C.

These men are chosen largely from the committee on military service appointed by the American Veterinary Medical Association. They are experienced in administrative work and are familiar with the veterinary problems of the country. One of them, Dr. C. J. Marshall, has spent some months in studying the operations of the veterinary service in the French and English Armies at the front.

The board is studying the veterinary needs of the Army under the present emergency and will make recommendations to the Surgeon General in regard to the organization and personnel of this corps.

According to the present plan, several hundred thousand horses and mules will be needed for the Army. The conservation of the

health of these public animals; the prevention of infections; the care and treatment of the sick and injured; the inspection of forage; the physical examination of all public animals before purchase; the sanitation and hygiene of corrals, animal depots, and hospitals; the transportation of horses and mules by rail and by sea; the supervision of the shoeing; the inspection of meats for the Army; and the necessary bacteriological and pathological work will require an immediate expansion of the Veterinary Corps.

Based on the experience in the French and English Armies, as to the number of veterinarians required per thousand of public animals, the Army will need a thousand or more veterinarians, depending upon its size.

As there are only about 120 veterinary officers in the regular Veterinary Corps, the large majority must be obtained from civil life.—*Official Bulletin, Washington, D. C.*

—Doctors J. R. Grigsby and E. M. Rundall have commissions as second lieutenants in the Veterinary Reserve Corps, and expect soon to see service in France.

—Dr. Robert H. Sewell, formerly of Hiawatha, Kans., is in the Army Veterinary Service and expects soon to render service in France.

—First Lieutenant Roy B. Whitesell, formerly of LaFayette, is stationed at Fort Benjamin Harrison, Indiana.

—Newspaper reports state that a veterinarian of Philadelphia has devised an artificial leg and crutch by the use of which he thinks many crippled horses and mules can be restored to service. The apparatus is made of tubular steel with a special quadrant spring imitating the vertical and lateral flexing of the ankle and fetlock. Instead of killing horses crippled on the battlefield, he believes that, with this device, many can be saved for light farm work, for breeding or to fatten for butcher meat.

—Dr. Ralph M. Bell, formerly of Utica, N. Y., is now stationed at Fort Reno, Okla., as 2d Lieutenant in the Veterinary Reserve Corps.

ASSOCIATION MEETINGS

AMERICAN VETERINARY MEDICAL ASSOCIATION

PRESIDENT'S ADDRESS

CHAS. E. COTTON, V.M.D., Minneapolis, Minn.

Members of the American Veterinary Medical Association and Friends:

Your committee on reorganization, in framing the new Constitution and By-laws, performed at least one kind act in providing that at the regular meeting the president shall deliver a *short* address. As the result of your kindness in conferring upon me the highest honor in the gift of the association, it becomes my duty and privilege to speak freely of the problems and conditions facing us during these momentous times.

I again express to you my sincere appreciation of this great honor. I wish also to acknowledge and thank the officers, members of the committees and the association for their loyal support and valued services. I cannot refrain from mentioning especially the untiring aid and team work I have received from Secretary Merillat, Treasurer Schneider and Editor Fish.

Our secretary has been painstaking and untiring in his efforts to promote the welfare of the association. He has succeeded in placing his office on a sound business basis.

The Constitution and By-laws fails to provide for any remuneration for the treasurer but it requires that he furnish a large bond. He is now keeping separate accounts and funds for the secretary's office and for that of the *Journal*. All bills must be itemized and paid by warrants on the submission of vouchers signed by the president and secretary. These duties require time and careful attention. The Constitution should be so amended that the treasurer shall receive a nominal salary.

Editor Fish is conscientiously striving to publish a journal of interest to every member of this association and to every progressive practitioner. I am sure that at times he becomes discouraged. He is not only the editor but also the business manager. He has other duties to perform in his college work and cannot possibly get out and come in contact with the members of the profession. You will all acknowledge that he is today publishing the best and

strongest veterinary journal ever published in this country. How easy it is for some of us to criticize, but let us put ourselves in his place. It is not a one-man journal nor is it published for any one's personal gain. It is your journal and mine and we should do everything possible to make it a success. We should submit articles, case reports of experiences in the field of practice and all available papers of value. Each State Secretary should act as a representative of the *Journal* in his respective state, consider it his duty to secure papers presented before the local and state societies and strive to secure subscribers and advertisements.

The reorganization, under the new Constitution and By-laws adopted at the last annual meeting, has caused numerous difficulties and new problems. The conduct of practically all business of the association was placed in the hands of the Executive Board and the Constitution also directed that this board should make "all necessary regulations for carrying into effect the provisions of the Constitution and the By-laws." It required five months before the Executive Board could be elected. There were a number of vital questions connected with the offices of the secretary, treasurer, and the *Journal*, which we thought should be solved immediately. I did not wish to assume the responsibility of deciding these questions. After consulting a number of the members who had held high offices in the past, and also obtaining the opinion of a most able constitutional attorney, I appointed an "ad interim" Executive Board to serve until their successors could be elected. Representative men from the five districts as prescribed by the Constitution were selected and, for the sixth or member at large, I appointed Veranus A. Moore to serve until his successor is elected at this meeting. This Executive Board met in Chicago, on December fifth, outlined and decided the business affairs of the offices and sanctioned the steps taken for putting into effect the provisions of the Constitution and By-laws.

Immediately following the last annual meeting, the secretary proceeded with the arduous duty of the election of the Executive Board, which was completed in February.

We have had to decide a number of questions which were of vital moment to the success of the reorganization and which could not be postponed for sanction by the Executive Board and the Association. We have thus succeeded in putting into effect the provisions of the new Constitution and By-laws.

Heretofore a complete change in the personnel of the offices and committees has been made each year. Members have assumed these important positions without preparation or a knowledge of the work, and by the time they have become familiar with the duties and outlined definite policies or made recommendations to the association other men have been elected or appointed in their places. Too frequently recommendations of the committees have been accepted by the association, published in the proceedings and there buried, never to be resurrected. The reorganization will succeed in putting the association on a more stable basis and will make for greater efficiency in the carrying out of our aims and deciding the problems confronting us. The administrative body and the important committees are more permanent and they will now be able to put into effect the various policies and changes recommended by the association from year to year.

The Constitution and By-laws, as a whole, reflect credit on the committee of reorganization. After the year's experience in striving to carry out the provisions, we find there are a number of changes necessary to correct the ambiguities and conflictions of some of the paragraphs and sections. There are also some changes and additions which, in the opinion of the officers, are necessary. As time will not permit me to enumerate them, they have been referred to the Executive Board, which I trust will make the proper recommendations to the association.

Our secretary found, after consulting attorneys, that we had no legal status, that the bonds of our officers are worthless for the protection of our association and that we could not continue to safely transact business and publish the *Journal* unless we were incorporated. Any four or five men could apply to any state in the Union and obtain a charter under the name of the American Veterinary Medical Association and prevent this organization from continuing the use of the name. At the annual meeting in 1915 it was almost unanimously voted to incorporate the association. Why the officers who preceded us did not act according to this instruction, I do not know. We decided that we were taking too great risk in deferring action longer and applied for incorporation and were granted a charter by the State of Illinois.

Shortly after my election, in view of the world conditions existing at that time and the possibility that our country would be forced into this awful war, and realizing that we, as a profes-

sion should show our loyalty and do our part in the preparedness, I referred the question to the Executive Board. They empowered me to take such action as I deemed necessary. The veterinary corps in the regular army had been organized by the medical corps. Many more veterinarians would be required, necessitating the organization of a veterinary reserve corps.

I appointed C. J. Marshall, of Pennsylvania, as chairman of a special committee on Army Veterinary Service and requested him to select the other members of the committee. When later it was declared that a state of war existed, the committee found they were facing a hard proposition in obtaining proper recognition of our profession in the organization of a veterinary reserve corps. As a result of the able and energetic work of Dr. Marshall and his colleagues, the outlook now is very encouraging for the officers of the veterinary officers reserve corps to attain the same rank as is given to officers of the medical reserve corps. If ever a committee's work deserved success and recognition, that of the special committee on Army Veterinary Service deserves it at this time. They have given their time and money unstintingly, untiringly and unselfishly. Dr. Marshall was compelled, at a critical time in the progress of the work, to undergo a serious operation and Dr. V. A. Moore, of New York, loyally volunteered to do his part and was placed as an adviser in the office of the Surgeon General to assist in the organization of a veterinary officers reserve corps. We will await the report of this committee with great interest.

This is the first time in the history of this association that we have convened under such conditions as at present prevail. The existence of our country is in the balance and I wish to urge all the members of the association and all members of the veterinary profession to show their patriotism and do their part in the support of the Government. We must act as a unit in the defense of our country and of world democracy. We must supply veterinarians for the Army, and food inspectors for the Army and Navy. We must also advise and assist in the conservation of the breeding and food producing animals. This can be accomplished by encouraging the farmers to raise a larger number of heifer calves and ewe lambs for breeding purposes, by advising them in regard to prevention and control of infectious diseases of domestic animals and fowls, and by encouraging them in the breeding of horses.

No war can be successfully waged without the use of horses

and mules. The success of artillery depends upon its mobility. The transportation of ordnance and food in the present world conflict depends to a great extent upon animals. In the month of July it was reported that the English Veterinary Service had accommodations for the care of only forty thousand animals and had seventy thousand as patients and were crying for more veterinarians. Our army will require the services of many efficient veterinarians and I wish to urge all of you who are able, to volunteer your services.

I would recommend that this association send a message to President Wilson, offering our services as a unit in this conflict.

America should assume leadership in the brotherhood of veterinarians. The veterinarians of Belgium, France and England and their families are suffering and many of them are in want. Before another year passes we may have the same conditions in the profession of this country. I hope that at this meeting some provision will be made for the establishment of a fund to help our brothers and their families. Practitioners who remain at home should volunteer to take care of the practices of their neighboring colleagues who have volunteered their services.

After reading the addresses of my distinguished predecessors, I have been impressed with their optimism in regard to the growth and accomplishments of this organization. Practically all of them have extolled the association and told us of the wonderful things that have been accomplished and what a great future is in store for us. I do not wish to convey the impression that I am a pessimist or pessimistic as to the future of this association. Our aim should be to help the veterinary profession and this association; to uplift our standards and advance our efficiency. I feel keenly our weaknesses and I appreciate the wonderful advances we have made in the past thirty years. We want progress for all and misfortune for none, and, above all, we want harmony. However, I think it is time that our attention be called to some of our weaknesses and shortcomings.

This association has twenty-six hundred members when it should have fifteen thousand. There are twenty thousand veterinarians in America. Why does this apathy exist? Is it the fault of the association or the individual members of the profession? I am satisfied that it is due to the apathy of the profession and the indifference of the practitioner. It is true that we have the ma-

jority of the representative leaders of our profession as members, but we should do something to institute a campaign to induce all worthy men in the profession to become members. If they wish to keep abreast of the progress that is being made in veterinary science they should become members of their state and of this association, where they can affiliate with, obtain the thoughts and take advantage of the achievements and high aims of the leaders in the profession. They owe it to themselves and to their profession to give their allegiance and support to this association.

The activities of veterinary practitioners are coming to be more and more restricted to the dairy and breeding districts. The inroads that have been made upon the use of the horse by gasoline motors are more than compensated for by the increase in the value and importance of the food producing animals. The opportunities for veterinarians who do not desire to practice are likewise enhanced. The Bureau of Animal Industry is constantly extending its work in meat and live stock sanitary control and adding to its forces large numbers of veterinarians. Our state veterinary services are in need of highly trained clinicians, pathologists and sanitarians. The army veterinarian has finally been recognized by Congress. This has not only made attractive positions but also given excellent opportunities for a number of ambitious and properly educated young veterinarians. The Surgeon-General and the medical advisory board of the Council of National Defense have recognized our special committee on Army Veterinary Service in its efforts to obtain suitable organization for the Army Veterinary Officers Reserve Corps. The veterinarian of the future must be a man well trained to fill these positions. If he is recognized as a professional man by the members of other learned professions he must have the same standard of education, culture and efficiency.

The time of the horse doctor has passed. The old plaintive argument that the country needs practitioners and that we wish to give the poor uneducated country boy a chance to enter the profession in order to meet the crying needs of the farming communities, has become threadbare and stale. All the other professions have closed their doors to this standard of preparation. There is now no reason why this young man cannot obtain the preliminary education, provided he is made of the right kind of stuff. Many of the men who stand out as leaders in our profession have been reared in country districts, have had to earn their way through

preparatory schools and colleges before entering upon their veterinary studies, and what is equally significant, they have continued to be students and investigators. The progressive and successful farmer and breeder of today is a student of animal husbandry, has a knowledge of breeds and types of animals, of feeds and feeding, and in many instances he has pursued courses on the nature of diseases, especially the infectious ones. The veterinary practitioner, if he expects to succeed, must not only do the work for these owners but also obtain their respect and confidence. To do this, the practitioner of veterinary medicine must be a man of broad knowledge and thoroughly trained in his technical subjects. This necessitates his obtaining a general as well as a technical education.

The examinations conducted by the various State Veterinary Medical Examining Boards and the Bureau of Animal Industry in the past few years, have resulted in the failure, in some instances, of as high as seventy-five to ninety per cent of the candidates. The results of the examinations of the Minnesota State Veterinary Examining Board in the past six years show conclusively that the trouble lies in lack of preliminary training, for in practically every case where a man failed in his preliminary examination he failed in one or more of the technical subjects. Our Constitution states that one of the objects of the association is to elevate the standard of veterinary education. Are we doing our duty? Why not face the condition truthfully, squarely and sanely? Do we want our professional ranks to be filled with men of this type, men who could not possibly enter any of the other professions? If we wish the standard of our profession to be kept low, then we should continue in our apathy and remove this section from our Constitution and no longer call ourselves associates of professional men.

A number of the schools of veterinary medicine demand a high school training as the minimum requirement for entrance, while others require as a minimum an examination which, if an immature child in the sixth grade of our common schools was unable to pass, would prove that he lacked mental capacity. That we can expect men of such low mental training and education to be able to intelligently study the science of medicine and the allied subjects, is beyond human comprehension, and still we have men, recognized as leaders in this association and profession, who claim that this is the type of men who are more capable of passing state

board examinations and who make better practitioners than many younger men that have had high school educations.

The members of this association are divided into two groups, the supporters of private schools and those who believe that veterinary education is the function of the state and who recognize that the necessary facilities for preparing practitioners cannot be obtained from the fees that the students are able to pay. This is unfortunate. While we recognize that in the beginning of veterinary education in this country private schools did a valiant work we are compelled to recognize that during later years they have not kept up the educational pace beyond that necessary to comply with the letter of the requirements for membership in this association. There are schools which are purely private enterprises, mere schemes under the pretense of a veterinary education to make money for their promoters and they cannot be honestly designated as veterinary educational institutions. Commercialism and not efficiency seems to have been the motive of their founders. The demands of the profession and the needs of the country for a better service do not seem to have been taken into account.

The standard of the profession is not judged by the leaders but by the general average of those holding a veterinary degree. We have had "big men" from poor schools and vice versa, but the good schools graduate more big men and the poor schools graduate more failures. The average student will comply only with the requirements of his school, but the energetic student will go beyond these and will advance in spite of his school. There is no college from which every graduate is a success, nor is there a school whose graduates are all failures. It is up to the individual, his energy and his desire for knowledge.

The professional schools of medicine, engineering, law and veterinary medicine, and also our high schools and colleges are better today than a generation ago and they are turning out higher grade men. The veterinary schools have progressed less than any of the others, but our advance has begun and *it will continue.* Our sister profession of medicine, through the influence of the American Medical Association, has placed all the accredited medical schools on a basis of minimum entrance requirements which are at least two years of college work, and the best ones require the successful completion of a four year college curriculum. This advance has been accomplished since 1904. Many of the colleges of

law and engineering now require from one to four years of collegiate work as a preliminary training. The result is that better prepared men enter these professional institutions and when they graduate they are recognized, not only in our own country but also abroad. Why should our veterinary colleges be inferior to those of other professions?

The young man of today after he has completed his high school work or collegiate course, finds it a difficult task to make his choice of a profession. Our profession is comparatively new in America and it offers great possibilities for service to mankind as well as for personal advancement. Other conditions being equal we cannot expect any young man with such an education to enter the profession when he finds our standard of requirement is comparatively so low. He will not wish to lower himself to that standard, but naturally will choose the profession that requires a high standard of education.

Let us look back and see what this association has accomplished. In 1907 we undertook to raise the standard of veterinary education by securing a uniform degree. This was only a partial success, as some of the schools which demanded entrance examinations equal to that of a high school, and others a high school preparation and three years of actual training, did not look favorably on the proposition. In my opinion they had the right conception, for even today, in the estimation of the public, men who are licensed to practice veterinary medicine, whether they are graduates of a high or low type of school, or any school, are looked on as of the same plane of professional quality. We must educate ourselves to the duties and obligations we owe to our profession and to the community. When we have done that, then and then only will our profession be recognizel. The next step to advance education was in 1910, when amendments to the By-laws were proposed and in 1911 adopted, providing for the matriculation requirements equivalent to those for admission to recognized high schools, and in 1914 matriculation requirements equivalent to one year of high school work; also a curriculum of not less than three collegiate years of not less than six months each, and beginning in 1913 the curriculum to cover twenty-four months and not less than three collegiate years. In 1912 a backward step was taken providing for a curriculum of twenty-one months, beginning in 1913. In 1915 the curriculum was advanced to a four year course of at least twenty-eight months to take effect in 1916.

The veterinary colleges which adopted the high school course for entrance some years ago report that the attendance immediately dropped but that within a few years it increased to a point beyond anything reached in the previous history of the institutions. The claim, therefore, that the high school entrance requirement will produce a shortage of veterinarians, or that it will permanently cripple the schools, is unfounded.

I am firmly convinced that we have thrown away enough time and to be consistent our minimum preliminary requirement should be the completion of a recognized standard high school covering four years or the equivalent thereof, which includes at least fifteen units, and in addition all veterinary schools should adopt a four year graded course of nine months each year. The higher requirements are necessary to the young men who enter our schools, to the profession and to the community.

I hope we are going to see that from now on there will be but one standard of veterinary education on this continent and that, the best.

VIRGINIA VETERINARY MEDICAL ASSOCIATION

The Virginia Veterinary Medical Association held one of its best meetings in Norfolk, July 13th. The program was especially good. Dr. H. K. Wright of the H. K. Mulford Co., and Dr. T. M. Owen of the B. A. I., gave splendid papers on the preparation and administration of anti-hog cholera serum. Dr. H. S. Willis of Gordonsville gave a splendid paper on milk fever. Dr. E. P. Yeager gave a good paper on tick eradication. These subjects were all discussed by the members of the association. The president's address on the younger veterinarian as affiliated with the state association was timely. The association adjourned to meet in Richmond January 13-14.

W. G. CHRISMAN, Secretary.

SAN JOAQUIN VALLEY VETERINARY MEDICAL ASSSOCIATION

On July 11th the veterinarians of the San Joaquin Valley of California gathered in Fresno and organized the San Joaquin Valley Veterinary Medical Association which will be an auxiliary to the State Association.

It was agreed to meet in Fresno on the evening of every sec-

ond Wednesday of each month, except at such times as it would interfere with the State Association meetings, at which time the meetings would be dispensed with.

The territory involved contains about fifty (50) veterinarians.

The following officers were elected:—President, Dr. John J. McKenna, Fresno; Vice-President, Dr. L. A. Danielson, Madera; Secretary and Treasurer, Dr. Jos. M. Arburua, Hanford.

JOSEPH M. ARBURUA, Sec.-Treas.

GENESEE VALLEY VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Genesee Valley Veterinary Medical Association was held at Dr. H. S. Beebe's infirmary at Albion, N. Y., on Wednesday, July 25th, 1917. Twenty members of the association and ten visiting veterinarians were present. A very interesting clinic was held in the morning. Dr. J. N. Frost of Ithaca operated on a variety of cases.

Lunch was served at the Elks' Club Rooms after which Dr. F. E. McClelland read a paper on Serum and Antitoxins; Dr. Joseph Wilder on Ridgling Castration; Dr. W. G. Dodds on Shipping Fever; and Dr. F. E. Cleaver on Some Changes in the Agricultural law.

Each of the papers brought out interesting discussions. Three new members were elected. The next meeting of the association will be held during the second week of January at Rochester, N. Y.

J. H. TAYLOR, Secretary.

SOUTH DAKOTA VETERINARY MEDICAL ASSOCIATION

MID-SUMMER MEETING. The South Dakota Veterinary Medical Association held one of the best and most instructive meetings in the history of the organization. On July 17th, at 1:30 P. M. the meeting was called to order by President Dr. H. A. Harwich at the Bond Place on the the south shore of beautiful Lake Kampeska with about thirty members and a number of visitors present.

The first number on the program was the address of welcome delivered by Col. Lee Stover of Watertown. Col. Stover obtained his military rank in the Philippine war and has since that time been engaged in the practice of law and agricultural pursuits. He is, at present, President of the Watertown Water Co., being en-

gaged in the raising of live stock at the present time, Mr. Stover was in a position to give the veterinarians of this State a very interesting and instructive talk.

The next number was an address given by Dr. C. C. Lipp, Head of the Veterinary Department of the State College. Dr. Lipp chose for his subject, South Dakota's Animal Health Laboratory and in an interesting manner gave us an idea of what the State will have and what it will be in a position to do for the live stock interests of the State when the new laboratory now under construction is finished. Dr. Lipp is a very interesting speaker and his address was very much appreciated.

The next number was an address by Dr. John Dinwoodie of the Extension Division of the Veterinary Department of the State College. Co-operation between County Agents and Veterinarians was his subject and the Doctor brought out some very interesting points showing the vital interest to the live stock industry of the State through our co-operation.

President Hartwich went over the numbers generally and gave us a very interesting but brief talk. After this the members and visitors, including the ladies, repaired to the lawn where a delicious banquet was served. When dinner was over the Launch "Stella Mae" was waiting for us and all enjoyed an hour and a half ride around the lake, after which all went by auto to the Council Chamber of the City Hall where we enjoyed the pleasure of listening to an illustrated lecture on the Pathology of Contagious Abortion in Cattle, given by Dr. W. L. Boyd, Head of the Veterinary Department of the University of Minnesota. Dr. Boyd's lecture was indeed a rare treat to the veterinarians of South Dakota and embraced one of the most interesting subjects facing the profession to-day. Dr. Boyd very kindly answered a number of questions following his lecture.

Wednesday morning's session was given over to business matters, the most important of which was the rescinding of the Mitchell Resolution which will permit members of this association to take out state deputyships and maintain their membership in the association. Many new veterinarians coming into the State in the past four years have been unable to be elected to membership on account of their holding deputyships which they were urged to accept at the time they took the state board examinations. Several new veterinarians were elected and others will join as soon as they are aware that the opportunity awaits them.

The afternoon was taken up with the clinic at Dr. Allen's veterinary hospital. Dr. J. P. Foster, former state veterinarian, demonstrated a new idea in spaying puppies through a very small incision without putting a finger into the abdomen. This operation would be very practical in operating on young puppies.

Dr. W. L. Boyd gave us a practical demonstration on the Treatment of Sterility in Cattle, subject being a pure-bred Holstein cow barren for two years. To a great many of us sterility work is entirely new and this demonstration proved very instructive as given to us in Dr. Boyd's congenial manner.

Dr. T. H. Hicks, former state veterinarian and probably the most expert ridgling operator in the northwest, demonstrated the ridgling operation; subject, four-year-old draft colt, right testicle in abdomen. The operation was performed in forty-five (45) seconds. Animal made an uneventful recovery.

After the clinic the meeting was adjourned. Every one present expressed themselves much pleased with the meeting and the pleasant stay at Watertown and at the lake. Our annual meeting will be held at Sioux Falls, January 15th, 16th, 1918.

S. W. Allen, Secretary-Treasurer.

COMMUNICATIONS

GREETING FROM FRANCE

Alfort, le 24 Juillet, 1917.

Mon cher et honoré Confrère:

Le Conseil des Professeurs de l'Ecole Nationale Vétérinaire d'Alfort m'a confié l'agréable mission de traduire à nos confréres des Etats Unis du Nord-Amérique, par l'intermédiaire de l' Americain Veterinary Medical Association, l'expression des sentiments de cordial attachement et de vive admiration qui le lient à votre grand et noble pays.

Avec la France entiére inébranlée et consciente de ses devoirs comme de ses droits, nous tressaillons de joie et de fierté à voir votre grand peuple nous apporter l'inappréciable appui de son concours moral, de sa pensée et de sa puissance.

Il est des phrases qui à elles seules conquerraient tout un peuple. Le "Lafayette nous voilà!" jeté le 4 Juillet sur la tombe du grand soldat par l'un de vos chefs les plus éminents, a fait tressaillir la France.

Des liens indissolubles attachaient l'une à l'autre nos démocraties. Voici nos coeurs intimement liés et nous voulons vous

donner l'assurance de la pérennité de ces sentiments, dont chaque citoyen des Etats Unis appréciera la vigueur et la sincérité en touchant le sol de France.

Veuillez agréer, mon cher et très honoré Confrère, l'expression de mon cordial dévouement.

H. Vallée,
Président du Conseil des Professeurs,
Directeur de l'Ecole d'Alfort.

TRANSLATION

My dear and honored Colleague:

The Council of Professors of the National Veterinary School of Alfort has intrusted to me the pleasing task of transmitting to our colleagues of the United States of North America, through the medium of the American Veterinary Medical Association, an expression of the feeling of cordial attachment and deep admiration which binds it to your great and noble country.

With all France firm and united, fully realizing her duties as well as her rights, we are moved with joy and pride to witness your great people bringing to us their inestimable support, their moral alliance, their profound convictions and their great might.

There are phrases which alone win a nation. Such an one—"Lafayette nous voila"! (Here we are!)—spoken at the tomb of the great soldier by one of your greatest leaders, deeply moved all France.

Ties which cannot be broken bind our democracies one to the other: and now our hearts are intimately joined and we wish to assure you of the never ceasing constancy of these sentiments, whose firmness and sincerity every citizen of the United States will at once appreciate upon landing in France.

Receive, my dear and honored colleague, this expression of our cordial devotion.

H. Vallée,
President of Council of Professors
Director of the School of Alfort.

NEW VETERINARY HOSPITAL IN THE PHILIPPINES

Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.

Dear Sir: Nearly one-third of the Veterinarians of the Army have served at Camp Stotsenberg, Pampanga, Philippine Islands, at one time or another and will remember the old nepa building used as a Veterinary Hospital; and in consequence they will probably be interested to learn that at last, after years of effort, a new hospital has been secured.

The old building accommodated eight head of stock and the auxiliary nepa shed twelve more. These will be retained for use as long as they remain in repair.

The new building is of reinforced concrete throughout and has, besides, ten box and twenty single stalls, the offices, storerooms, dispensary and operating room. Although it could be improved in many ways and might not please everyone it is a vast improvement over the old conditions.

This building was designed by Mr. T. W. Matsdario, the post

1. The Old Veterinary Hospital, Stocks and Dressing Floor. Camp Stotsenberg, P. I.

2. The New Reinforced Concrete Veterinary Hospital at Camp Stotsenberg, P. I.—The old building in the rear.

engineer, assisted by suggestions made by veterinarians Gould and Foster.

Dr. R. J. Foster has the care of the animals of the 9th Cavalry, numbering 1240, and Dr. J. H. Gould has the six batteries, four pack trains and headquarters company of the 2d Field Artillery, animals numbering 1040, in charge.

(Signed) N. S.

MISCELLANEOUS

—Dr. J. T. Purcell has removed from Rapid City, S. D., to Lincoln, Neb.

—The marriage of Miss Lola Margaret Marriott to Dr. Erwin Veranus Moore of Ithaca, N. Y., occurred August 21.

—Dr. L. A. Merillat of Chicago will conduct the course of surgery at the Kansas City Veterinary College after the holidays.

—The wedding of Miss Minnie Harris of Coshocton, Ohio and Dr. A. Slawson of New York is announced. They will be "at home" in New York City after October 1.

—Dr. Warren B. Earl has been transferred from Kansas City. Kans. to the serum inspection work at the Mulford Laboratories at Glenolden, Pa.

—At the forty-third annual meeting of the Ontario Veterinary Association at Toronto, Canada, steps were taken to urge the provincial government to take action in the matter of protecting the profession from unqualified practitioners, and to encourage young men to enter the profession. Dr. C. S. McDonald of Toronto was re-elected president, Dr. H. E. Hurd of Toronto was elected secretary-treasurer.

—Dr. Alex. Plummer has removed from Los Angeles to 1140 Sutter St., San Francisco, Cal.

—AN IMPORTANT DECISION ON POTENCY STANDARDS FOR SERUMS. An Iowa law makes it the duty of the director of the State chemical laboratory to "establish and declare the standard degree of potency of hog cholera serum for successfully treating, curbing and controlling hog cholera." Sale of serums failing to come up to such standard is made unlawful. As a purported compliance with this law, the director of the laboratory adopted the following requirement: "The dose, which shall be stated on the label, must be sufficient to prevent a susceptible hog of the weight the dose is recommended for, from showing symptoms of hog cholera when injected hypodermically with two cubic centimeters of virulent blood, which will produce hog cholera in susceptible hogs of the same weight within eight days after being inoculated with the same quantity of virulent blood." In the recent case of Hollingsworth vs. Midwest Serum Co. (162 Northwestern Reporter, 620) the Iowa Supreme Court denies the right of plaintiff to recover

damages claimed to have resulted from defendant's sale of serum not conforming to the standard fixed by the director of the State laboratory; the decision being based on a view taken by the court that the director's regulation is not responsive to the law under which it purports to have been adopted, in that the law contemplates a standard test applicable before sale of serum, whereas the director's test applies to results to be obtained by the buyers. This discrepancy in the time as of which the test shall be made is found to be material in view of the undisputed fact that such serums deteriorate rapidly.

"If the director of the laboratory had prescribed some definite test which should be conformed to by the producer before he should market his serum," said the Supreme Court, " it would doubtless have been fairly responsive to the statute, and, perhaps, the only compliance therewith possible. We are satisfied, however, that no power is conferred upon the director to declare that ultimate results in the use of the serum shall be conclusive upon the producer or render him subject to prosecution notwithstanding that the serum met the legal test at and before its marketing. The statute does not make the producer a warrantor of results, nor does it authorize the director to make him such. This view is emphasized by the further consideration that the serum when completed is subject to rapid deterioration, and has need to be kept with great care under seal and refrigeration. We are of the opinion, therefore, that the declaration of the director was not responsive to the statute, and was not warranted thereby. The criterion which the director is authorized to declare must be applied as of the time at or before the marketing of the serum and not after marketing."

The result of this holding is that there was no violation of the Iowa statute. As additional points affecting plaintiff's right to recover, the court holds that the burden was on him to show that the defendant negligently failed to furnish reasonably effective serum, and that the evidence was insufficient to establish such negligence. —*Druggists Circular.*